The Builder.

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The Picturesque of Cottage Architecture.

IT is one of the most difficult tasks to analyse the elements that go to make up what is felt to be picturesque, whether in the abstract or the concrete. There is no doubt that age has a good deal to do with the impression of picturesqueness in a building, not only from what is called association, but from the colour and surface texture given by weathering. It is only just now that architects and decorative artists are beginning to recognise the full importance of texture or surface in the effect of architecture and decoration. A few days ago we passed a house three or four years old, in a seaside district, which we recognised as one of which we had seen a pen-and-ink drawing by the architect in the Architectural Room at the Royal Academy, about the time when the house must have been in course of erection. The drawing, a rough powerful pen-and-ink one of a portion only of the house, gave the impression of an almost wild picturesqueness, though, as we observed at the time, it did not look in the least like a new or modern dwelling-house. The same features in the actual house were quite recognisable, but where was the wild picturesqueness gone? The actual house looks thoroughly modern, and presents no very picturesque appearance; yet its features were correctly represented in the drawing—all except the smooth hard texture of the new brickwork. That was masked by the rough and effective drawing of "the inspired penman" (we believe in this case the architect himself). Here was no colour even, but simply the roughened texture implied in the drawing, aided by a rather powerful artificial effect of light and shadow, imparting a highly picturesque expression to a building which, as it stands at present, would never attract the notice of any sketcher in this respect, though it may do so when two hundred years are past.

That is one element, and certainly an important one, in the picturesque effect of old buildings. If, however, we endeavour to put this effect of age out of sight, to "think it away" (to borrow an expression from metaphysics), and picture the old cottage as it was when first built, we shall still find in many cases an element of architectural and picturesque interest which is not often found in the country cottage of to-day, except in the cases where an architectural designer has specially aimed at such an effect; an aim which not infrequently defeats itself: nothing is so far from the real thing as an elaborately contrived picturesque. On the other hand, it must not be too easily accepted that a very simple new building will look picturesque because some very simple old ones appear so. Mr. Nevill seems to have rather overlooked this in the introduction to his book on Surrey Cottage Architecture, recently published,* the main portion of which appeared first in our pages. He says, "The great lesson to be learned from the study of these old examples is, I take it, the extreme value of simplicity. It is a lesson peculiarly needed, since even when an architect is anxious to work on such lines, it is seldom that his client is content to let him. There is far more beauty in a cottage of some of the simpler forms shown, with its roof bright with lichen and its front covered with creepers, than we shall ever get from modern examples, tortured as they are into fantastic shapes where all repose and simplicity are lost." Very likely; but then lichens and creepers cannot be put on a new cottage to order; and possibly the cottage which now looks picturesque, with these additions of nature, would have looked rather bald and bare when new. The author, indeed, admits that he has been told that some of his examples are not architecture at all, but "barns." This would be true of some of them, regarded as new buildings; as old ones they all have a certain interest. But when the author speaks of these examples as intended to enforce the importance of "the perfectly simple treatment of simple buildings," we must perceive on consideration that this principle cannot be pushed too far, and that the mere carrying out of this recommendation in its full sense would result in the abandonment of everything that can properly be called architecture. The modern estate agent's brick cottage, with a slated roof in one span and a square sash window on each side of a central door, is "a perfectly simple treatment of a simple building," but it is neither picturesque nor architectural. Nor does Mr. Nevill himself carry out this theory in designs of his own for cottages, some of which have been exhibited at the Royal Academy and illustrated in our pages. Some of these, we should say, show a decided intention to produce a picturesque effect.†

Granting, however, that there is a considerable degree of picturesque character in a majority of the old cottages illustrated in this work, and that this is mostly attained along with simplicity and an absence of any obvious attempt at ornamental effect, it is useful to notice in what it is that this picturesque expression resides, so much of it as would still be left if we could go back to the days when these cottages were just newly built. A very great proportion of the effect undoubtedly results from the employment of half-timber construction. This, when filled in with plaster or rough-cast, gives so much variety of effect and surface to a small house, and is so completely in keeping with our ideas of rural architecture, so much in harmony with rural landscape, that a house or cottage thus built can hardly help being more or less picturesque; though there is no doubt considerable scope for "more" or "less" in the matter. In the first place, as the author truly remarks, the filling-in of the panels with ornamental quarterings was much more picturesque in effect when curved pieces were used, "cut out of the angles of crooked boughs and limbs of trees that would have been useless for ordinary building," than when, at a later date, straight struts were used. But a more important element in the effect of this method of building appears to us to lie in the partial use of it in contrast with masses of more solid wall. Whether this was done with any kind of intention of effect by the original builders of these cottages it is difficult to decide; but it almost seems as if it must have been so. We find one gable of a house half timber, the other half brick, or tile-hung; or we find, as in the author's sketch of a cottage at Burningfold (page 86) the two end gables plain and the upper story of the intermediate portion treated in half-timber work of a simply decorative character, stopping against the two slightly projecting wings. This is certainly what may be called architectural design; nor is the whole, which is very picturesque, an example of extreme simplicity; on the contrary, we rather question whether the author, if he found a modern architect designing this cottage, would not accuse him of making an effort to be picturesque. It must be admitted, however, that the modern picturesque-maker

* "Old Cottage and Domestic Architecture in South-West Surrey, and Notes on the Early History of the Division." By Ralph Nevill, F.S.A., F.R.I.B.A. Guildford: Billing & Sons. 1889.

† See illustrations in the *Builder* for August 6, 1887; and March 3, 1888.

would probably not have been content to leave the gables so plain; he would very likely have defeated his own end by ornamenting them with the same elaboration as the centre. The same kind of contrast arises, in a manner purely spontaneous and practical, in cases where, the bulk of the walls being of timber-work, the outside chimney forms a bold mass of brickwork running up through the more frail construction, and presenting a solid unbroken mass in contrast to it. This is so effective that it has been frequently artificially imitated in modern houses of late years; but in the old examples it was a piece of effect arising purely out of practical conditions; it was convenient and economical to build the cottage generally of half timber; it was impossible to build chimneys so; hence an effective contrast. This comes out even in plan, as in the plan Mr. Nevill gives of the homestead of Hawlands (p. 13), where the mass of solid wall forming the fire-places and carrying the chimney-stacks stands by itself in the middle of a series of thin timber partitions.

Contrast of this kind is, therefore, no doubt, one of the sources of picturesque effect, and it is obtained very easily when there is a joint employment of solid brick or stonework with post-and-pan work; and even without this element of contrast the post-and-pan work is, as before observed, in itself one of the most picturesque methods of building. But whether it is worth while, or in accordance with architectural common sense, to revive this method of building arbitrarily and merely for the sake of picturesque effect, seems more than questionable. In most English towns it is now forbidden by building by-laws; and for country cottages, though there are not the same objections to it on the score of danger from fire, it does not make either so comfortable or so durable a house, and there are few neighbourhoods now where it is cheaper than brick or stone. It appears to us, therefore, that, except where it does constitute an economy, there is no excuse now for building the walls of the habitable portions of cottages in this manner; it is, in fact, not such good building for its purpose as a brick wall, and Mr. Nevill admits that even the herring-bone brick filling, in place of plaster, which is more solid and looks very well, is by no means adapted for any wall exposed to a rainy quarter. Where "black and white" work may suitably and legitimately be used now, without putting the picturesque before the practical, is perhaps in the gable ends of roofs, which close in nothing but a roof space, and have not a habitable room behind the partition. Here the timber and plaster work forms part of the roof merely, and can be used with economy, perhaps,—at all events with suitability, and with some addition to picturesque effect.

Another source of effect or of character in these old cottages consists undoubtedly in the unsophisticated manner in which windows and other openings are placed just where they are wanted, and just the size it happened to be convenient to make them at the moment, without considerations of symmetry. This kind of naïve irregularity is not, properly speaking, architectural design, nor is it suitable to houses of any size or pretension to dignity; but it is exceedingly suitable to the character of a humble country dwelling, in which the most must be made of the space, and the windows must be got in where they will least interfere with the use of the wall-space within the room. In many old cottages these windows, in the upstairs rooms especially, are a great deal smaller than the proper observance of sanitary conditions would demand; too small also for the proper and convenient amount of light; and it is impossible to recommend any imitation of such practical deficiencies for the mere purpose of effect. Yet there can be no doubt that it is to these small windows, oddly and heedlessly disposed, that much of the character of these old cottages is due. In the originals this was no doubt a form of simplicity; to deliberately imitate it now would be, however, the reverse of "simplicity." But the example of the old cottages in this respect may at all events teach us that it is not necessary or even advisable to aim at symmetrical spacing and size of windows in a simple cottage building. Let the windows be large enough for all purposes of light and air, but leave them to fall in as they will most conveniently with each room: they will tell the story of the house, and relieve it from all pretence of aspiring to be more than a cottage.

The corbelling-out of the upper stories of old cottages is also, no doubt, a great source of picturesque effect; but in general any modern imitation of this must be merely a made-up effect for the sake of picturesqueness. There is no practical reason or excuse for it in country cottages with plenty of ground around them; and it is difficult to understand the motive for it in the case of the old buildings. The probable explanation is that the habit arose out of the conditions of building in walled towns, where it was an object at once to keep as much roadway as possible on the ground level, and to get as much interior space as possible by over-sailing the upper stories; and that then this practice was carried out in the country, merely as an acquired habit of building, though the practical reason for it did not exist. It was not done consciously for effect, we may be pretty sure; it had come to be a commonly accepted way of building a house. There is one of Mr. Nevill's old cottages, that at Milford (page 64), in which this over-sailing construction is very effectively used, being applied only to the two projecting gabled wings at each end of the house, which over-sail in two successive tiers, while the recessed portion between is left vertical; this looks like design, but no doubt the real reason for this arrangement is that the flooring-joists run different ways in the two portions of the house, and present facility for over-sailing in one portion more than in the other; and so far the treatment is to some degree the expression of the construction. But except where there is some special reason for reducing area on the ground-floor of a house, the building of houses with over-sailing upper stories in the present day is only a piece of artificial picturesque, which does not improve the house for its practical purposes, though it undoubtedly does add to its effect from the picturesque point of view.

Another thing that is noteworthy in this collection of old cottages and country houses is the entire absence in them of any exaggerated elaboration of roof-line, or bargeboards, or finials, or any of those gimcracks which modern builders, and occasionally modern architects (in France certainly, if not in England), consider essential to the picturesque. In this sense these old pieces of rural architecture do no doubt convey the lesson of simplicity to which the author has referred; though, as already observed, there is no need to push this idea of simplicity so far as to depend for all the picturesque interest that a cottage can have on Nature's future additions of lichens and creepers. These, no doubt, furnish a picturesque element, but it is not the picturesque of architecture.

The author observes in the preface that the sketches are intended mainly to show the facts of the architecture, and is good enough to add that "the drawings were originally published in the *Builder*, and the process of lithography employed for the purpose has its limits." It might be supposed from this that we were the special employers of an inferior system of production which had prevented Mr. Nevill's artistic powers from having full scope. Line-drawing has its limits, no doubt, in regard to effect, and its facsimile reproduction by photo-lithography has the one further limit that it makes no distinction of tone except by thickness or thinness of line. But it does not seem to have occurred to Mr. Nevill that there may be another kind of limit, that of the power of the draughtsman. Many architectural illustrations of the highest class have been produced in this journal by precisely the same means as were at Mr. Nevill's disposal. His drawings are quite adequate for their purpose as illustrations, but they are not remarkable for artistic power; we did not publish them as such, but as apparently correct representations of an interesting series of old buildings; and considering the terms under which they were first published by us were such as must have rendered very material assistance towards their publication as a book, we should have expected from the author a somewhat different kind of reference to our part in the matter than an attempt to make us, in the eyes of the reader, responsible for a weakness in the style of the illustrations which is entirely the result of the "limits" of his own powers as an artist.

TURBINES.

THE author's purpose in writing this book* has been, as he states at the outset, "to give in as elementary a manner as is consistent with accuracy and thoroughness, an explanation of the principles underlying the action of turbines and pressure engines;" also to deal with the applications of these principles to the design of various manufactured motors, giving descriptions of the best distinctive types, but omitting the most obsolete forms; adding accounts of the results derived from experiment and a comparison of the same with theoretical investigation. So far, the author has attained his object. It is the best English work upon the subject which has yet been placed before the public. With the exception of the reference to the *Mechanics' Magazine* dated December, 1838, describing Armstrong's (now Lord Armstrong) rotary motor, historical matter is avoided. The author makes no claim to an exhaustive treatment of the subject, and has taken great pains to collect the dimensions of turbines actually made. In some cases the dimensions are given in Prussian feet; but the relation to English measurement is given on page 344, by which it will be seen that for purposes of comparison by an English reader, the record of the actual measurements in this way is sufficient. The illustrations and tabular statements are worthy of the highest commendation. The summary of rules and formulæ, in four folding plates, followed by numerical examples, and a record of the results obtained by various experimenters in dealing with the flow of water over weirs, are all carefully prepared, suitably introduced, and are placed before the reader in a very intelligent manner.

A turbine is defined as "a motor for utilising the energy of water by causing it to flow through curved buckets or channels, in which it exerts a reactionary pressure constituting the motive force." In the design of a turbine the ratio of the guide outflow area to the bucket outflow area is considered as a starting point. Turbines are divided by the author into two classes,—reaction and impulse turbines. He shows that in a reaction turbine it is essential that there should be continuity of flow of the water in every part of the motor and of the apparatus connected with it; while in an impulse turbine the construction is such that the buckets are only partially occupied by the water passing through them, thus allowing the atmosphere to contribute its influence in the operation. Care must be taken in the construction of a turbine to round off all corners of the apparatus, as sudden turns increase the hydraulic resistance to be overcome. A section-tube will improve the efficiency of a turbine by relatively reducing the velocity with which the water finally leaves the motor, as the loss from unutilised energy is mainly due to this cause. In a reaction turbine the actual velocity may be found in practice to exceed the theoretical velocity, but, as the author remarks, "it must not be supposed on this account that there is any violation of the ordinary laws of mechanics,

* "Hydraulic Motors, Turbines, and Pressure Engines," by George R. Bodmer, Assoc. M. Inst. C.E. London: Whittaker & Co.

from which perpetual motion might be deduced!"

In dealing with the design of an impulse turbine, the author shows that the same assumptions are made with respect to the maximum efficiency of the wheel as for reaction turbines, namely, that the highest results are attained by a combination of entry without impact and radial exit, as there is always a loss of efficiency attending a shock of water. One striking characteristic of American turbines is that, as a rule, they are designed so as to leave the water to follow as far as practicable its own course, thereby considerably reducing the element of frictional resistance. In the design of an impulse turbine this is an essential condition, the water after quitting the guide passages following in one direction its own course, and during its transit through the wheel being at all times under atmospheric pressure only. In comparing an inward flow with an outward flow turbine, the author reminds us that as a particle of water flows outwards in a radial wheel, the successive parts of the vane surface with which it comes into contact have an increasing speed, and the deflection of the stream produced by any given curvature of the vane becomes less the greater the distance from the axis. With an inward flow turbine the reverse of this takes place, and, as the author states, "the same vane curve referred to a line normal to the direction of rotation will cause a greater absolute deflection of the stream, in an inward flow wheel, than in an axial wheel, and in the latter again a greater deflection than in an outward flow turbine." The guide vanes can be of wrought iron or steel plate cast in with the casing, and the wheel vanes of cast-iron, with their edges tapered off. These vanes, offering less resistance to the passage of the water, are preferable from a theoretical point of view, but more substantial vanes are not so soon affected by rust. Certain relations exist in every turbine between the angle of the vanes, the velocity of the flow, and the speed of the wheel; but the author adds that, with given proportions and angles, the form of the vane curves is not of so much importance as the thickness. The distinctive features of American as compared with European practice appear to consist in providing a comparatively smaller number of guide and wheel vanes, a greater relative width of buckets, both at the inflow and outflow ends, and means for regulation by pivoted guide vanes or circular sluices between the guide passages and the wheel. Modern axial impulse turbines are constructed in such a manner that, in flowing over a vane, the stream of water can spread itself out so as to increase its width to a certain extent.

The author says in his introductory remarks that "when coal becomes dearer, as it undoubtedly will, more attention must be paid to the hydraulic resources of the country." We agree with him, so far as pressure engines are concerned. Arthur Rigg's patent revolving engine, which is described among others by the author, is performing useful work at one of the pumping stations connected with the East London Waterworks, and numerous lifts are at work in this country, worked by hydraulic pressure accumulated at a central station. We doubt very much, however, whether turbines can ever be much in demand in this country. Our waterfalls are not generally situated in districts where the machinery is required to work; and where, in a manufacturing and hilly locality, there exists sufficient water-power to work a turbine, the horse-power is very limited. Hence expensive and sometimes complicated gear, attended with slow results, is needed to produce increased power. In America they possess greater facilities for utilising water-power, and many of the turbines at work in that country can lay claim to extraordinary efficiency. At Holyoke, in Massachusetts, in the United States, there is a large permanent installation for testing the effective power of turbines.

Hydraulic pressure-engines are suited for utilising comparatively small quantities of water at higher pressures than are generally advantageous with turbines. The author proves that whereas the speed of a turbine is determined by the velocity of the flow, which in its turn depends upon the head, irrespective of the quantity of water supplied, in a hydraulic-pressure engine with a given supply and head the speed may, within reasonable limits, be made high or low, as desirable, by giving the piston a smaller or greater diameter and an inversely corresponding stroke. Efficiency is promoted by a low piston velocity, but, of course, with high pressures, the speed may for a given efficiency be greater than with lower pressures.

In comparing mathematical formulæ with experiment, it is possible to obtain expressions containing coefficients the values of which, for average purposes, furnish results sufficiently accurate to be used in designing various classes of hydraulic machines; but it is to be observed, as the author shows, that unless the workmanship of two or more turbines of different kinds under test is of the same quality, the comparative results will be unreliable.

NOTES.

IN the last number of the *Semaine des Constructeurs* is an interesting letter from M. Métivier, Architect of the Department of Gers, on the often vexed question as between the architect and the engineer. In the course of his letter he says:—"The architect and engineer have, for the most part, two distinct methods of conceiving and drawing out a design. The former thinks at first exclusively of the form, and does not pass to the question of stability until, having got his design into shape, he says,—'how will it stand?' The engineer, on the other hand, occupies himself first with the question of stability, and adds to it such form as his natural aptitudes and his general comparative inability in the use of the pencil will enable him to add. Of these two systems of procedure it seems to me that the architect's is much the superior. One ought to design first and calculate afterwards: in other words, architecture is both an art and a science, but before all an art." M. Métivier goes on to say that the general deficiency of an architect is that he does not know enough about calculation, and of an engineer that he does not know enough about designing; but the balance is not to be adjusted by rolling an architect and an engineer into one, or rather associating them together, to make up each other's deficiencies, as was done in the case of the Trocadéro, where M. Davioud did the designing and M. Bourdais the engineering. The result of this is, he thinks, that there is no longer the unity of conception of one mind. Give the architect, while retaining his artistic training and genius, such a scientific training as will enable him to dispense with the assistance of the engineer; in short, says M. Métivier to the editor of the *Semaine*, before "Hautes Études" let us think a little more of "Études" and their improvement. The most important point in M. Métivier's letter is his way of putting the matter as between designing and merely constructing, that the first is the higher intellectual effort; which is perfectly true, though of course even in the initiatory stages of designing the idea of the ultimate construction must be present to the mind.

TO the current number of the *Portfolio* its accomplished editor, Mr. P. G. Hamerton, contributes a curiously perverse article on "the Eiffel Tower, from an artistic point of view." Mr. Hamerton is rather tolerant to the Tower in an artistic sense, describing it as "a kind of land light-house, made to resist the wind and not the waves," and says it cannot be denied that it seems to exercise a kind of increasing fascination on spectators; "they resist it at first for reasons of art-criticism, but it attracts and subjugates them in course of time." We presume Mr. Hamerton has experienced this feeling, as he says; our experience has been the reverse. But the oddest thing in Mr. Hamerton's article, and what makes us apply the epithet "perverse" to it, is his remark that "a concession to ideas of beauty has been made by the introduction of four unnecessary arches beneath the first and largest platform" (!). This is really an extraordinary example of the manner in which art-critics trip up when they come to talk about construction. Not only are the "unnecessary arches" an important portion of the tie of the base, and therefore of the security of the whole, but (as Mr. Hamerton would find out if he read M. Eiffel's own article on the Tower in a recent magazine) they form precisely the constructional feature which M. Eiffel specially prides himself on, and which he has applied in the bridges of which drawings are given in the Eiffel pavilion, of one of which we gave a sketch elevation in a "Note" in our last issue. It is extraordinary how people who know nothing about construction think themselves competent to settle these points.

THE above slip about construction, however, odd as it is, is venial compared with the extraordinary ignorance displayed in an article in the current number of the *Art-Journal*, in which a lady whose name is unknown to us as a writer on art has been allowed to enlighten the public on the use of "the acanthus, the lotus, and the honeysuckle" in architectural ornament. Not only have we seriously brought out again the old and long-ago discarded fables about the derivation of the Corinthian capital from a basket of flowers with a tile on the top, and of the Ionic volute "from the curls worn on each side of the human face," a derivation which, we are told, "seems to have been very generally accepted" (has it?); but Miss Laura Dyer also exhibits her knowledge of architectural detail by informing her readers that "the Doric pillars of the Parthenon at Athens, built in the time of Pericles, had no more elaboration to show than the ruins of the tomb of Beni Hassan in Middle Egypt, built 1,400 years before the earliest known Greek examples." Hadn't they? Miss Dyer had better refer to Penrose's "Athenian Architecture," or some other authoritative work, and learn what a Doric column and capital was really like, and how it was designed, and then compare it with a photograph of the Beni-Hassan post (for it is no more). Miss Dyer further illustrates her knowledge of architectural history and the development of ornament by informing us that "the Ionic scroll or volute was the step between the simple Doric and the ornate Corinthian styles" (!!). The three features have no relation in historical development whatever. The Ionic and Doric capitals came from different sources, and were used simultaneously at Athens side by side. The very fact that the Greeks were capable of developing and perfecting two independent types side by side (they did not perfect the Corinthian) by an effort of æsthetic perception, is exactly what separates their work by such a distance from the spontaneous evolution of ornament by the Mediæval architects. It is too bad that such ignorant nonsense should be admitted into a periodical specially professing to instruct its readers on artistic subjects.

WE have received a pamphlet (no publisher's name) giving a description, with illustrations, of a form of bath which is called "spray baths *for* the million," the invention of Mr. David Grove, the engineer to the German Imperial Court, whose elaborate scheme for heating and ventilating the German Houses of Parliament we described and illustrated some time ago. Mr. Grove's system was elaborated when he was commissioned a few years ago to plan a bathing-house for the barracks of one of the regiments of the German army. The problem was to enable several companies of men to bathe in the shortest time and at the minimum of expense; and the essential feature of the system consists in the employment of a number of spray baths operating from nozzles or roses placed at

regular intervals on a long pipe emitting tepid water under pressure sufficient for the purpose; the fall from a cistern placed at a higher level being sufficient for this, or the ordinary pressure of the town water-supply. The floor-space under the spray-nozzles is divided off into compartments or stalls, one for each person. The floor is of course formed of a material that will readily carry off water, and laid with a fall for the purpose, the bathers standing on lath frames. A short extract from Mr. Grove's description of the process of regimental bathing at the barracks referred to will best explain the advantages of the system for wholesale bathing:—

"At the commencement of bathing, three detachments, each led by their non-commissioned officers, march at one and the same time through the prescribed door into the bath-room, and each man takes the seat corresponding with his number.

Detachments 1 and 2 will then begin to undress, and as soon as detachment 1 is ready, each man, at the command of the non-commissioned officer "Enter," will step into the compartment bearing the number of his seat. This having been done, the divisional officer will report to the bath superintendent "Compartments filled," whereupon the latter, by pulling the chain of the valve, will set all the sprays in action. The bathers standing under the sprays will then let the water shower on the front and back of their body, rub themselves with the soap which they must always take with them, and see that it is well rinsed off; proper attention must also be paid to cleaning the feet.

In about three minutes the bath superintendent commands, after closing the valve: "Leave the compartments!" whereupon each man will repair to his appointed place, in which, under the superintendence of the detachment-subaltern, he will wipe and dress as quickly as possible.

While the first detachment is bathing, the second will undress entirely, and the third commence to undress, so that as soon as the first has left the bathing compartments, the second at once enters, and the procedure described above is repeated."

Mr. Grove states that when strictly carried on 100 men can be bathed in about twenty minutes from a pipe with nine double sprays, with compartments on each side, the bathers standing back to back. He proceeds to strongly recommend it for adoption for public baths at a very cheap rate, which would bring a daily bath within the reach of the very poor. That would be a great blessing if the very poor could only be induced to make use of it; it might be worth while to give it *gratis* at the expense of the rates, as a matter of public hygiene. But Mr. Grove forgets that the efficiency and economy of the system depend to a great extent on the precision of drill which he describes in regard to its regimental use; and this can never be applied in the same way with the general public, especially those of the lower orders. Probably two of the things that the lower orders (in England at any rate) dislike most are washing and any kind of drill or methodical action. But for schools, where boys are under control, the system might prove very advantageous indeed, in giving opportunity for wholesale and thoroughly efficient ablution daily with the least possible loss of time; and it is worth the attention of those who are concerned in the planning and fitting up of schools.*

THE Archæological Institute of America has just published the "Seventh Annual Report of the Managing Committee of the American School of Classical Studies at Athens," together with the Reports of the Annual Directors, Professor Martin L. D'Ooge, Ph.D., and Professor Augustus C. Merriam, Ph.D. Professor D'Ooge's report consists chiefly of an account of educational tours made and meetings held at the school. Professor Merriam's is of unique interest, as it contains the fullest account as yet accessible of the now famous excavations at Dionuso. We have constantly noted the progress of these excavations, and so need only refer our readers to Professor Merriam's excellent practical summary. The text is illustrated by a map of the district round Ikaria, and three photographic views of the beautiful site of the excavations. The American School at Athens adopts advisedly a somewhat different standpoint from, *e.g.*, the German Archæological Institute. Its object is professedly more popular. Though it does not neglect to excavate, its chief *raison d'être* is advisedly to afford to American scholars opportunity to visit Classical lands and study Classical antiquities *in situ*. Hence one of its principles is that there should be two directors, one permanent,—who is to be, when they can secure him as a permanency,—Dr. Waldstein, the other annual, to be chosen from some American school or college. This system of a second annual directorship obviously tends, as the report states, not to the education "of trained specialists" for the present, though it is certain for the future, but to the "animation of Classical studies in America."

AMONG the minor buildings of the Paris Exhibition, few are more successful and more original in design than the pavilion built for the Argentine Republic from the designs of M. Albert Ballu. There is a plinth with a very bold moulding running round the whole and connecting it; the centre feature of the principal façade has a central and two side arches which abut against square turrets of iron framing filled in with terra-cotta in panels, having in the centre of each panel a large pyramid-shaped boss of coloured glass; these are in reality glass shades capable of being lighted beneath for illumination effects. The arrises of the arches are treated with a concave moulding with ornaments in red and gold on a blue ground, and the deeply-sunk soffits of the arches are decorated with large rosettes in square panels, of Classic fashion. The large angle turrets of the building are also framed in iron, with a great deal of decorative filling in coloured tiles and terra-cotta. The central doors, in a kind of trellis-work pattern, are well designed and in keeping with the whole character of the building; these doors are also ornamented in the lower portion with coloured glass bosses, red and blue. The intermediate portion of the building, between the centre and the angle turrets, is divided into three bays on each side by pilasters (which are too thin in proportion, and spoil the effect), the space between them being filled in the lower part with terra-cotta decorative panels with coloured centres of tiles and glass bosses, and above with a diaper of blue and white tiles, over which is a light arcade, while a modillion cornice crowns the whole, stopping against the centre and angle turrets. The whole effect, in regard to colour and design, is gay, bright, and picturesque, and at the same time truly architectural in character and quite free from eccentricity or vulgarity. As an example of architecture for a temporary exhibition pavilion it has great merit. Among the contents of the pavilion, which are mostly purely industrial in character (including, however, a large collection of specimens of timber), is a large-scale relief map of South America, about 20 ft. long, executed on a true section of the curve of the earth's surface; a form of model which presents in a very realistic manner to the eye the actual facts of the configuration of the earth, and suggests a very practical form of geographical lesson for children.

THE Cathedral of Worms is to be restored. The question has been locally discussed for the last three years, and although experts who were consulted agreed that there was serious mischief going on which was endangering the structure, they differed as to the cause. Thereupon the Dean, Mr. Fehr, took the matter in hand by causing a number of faulty places to be uncovered, and then published the result and his opinion in a pamphlet. His arguments appearing unanswerable, the building committee have determined to go to work at once, and have called in Professor Freiherr von Schmidt, of Munich, the architect of the recently-restored Church of St. Catherine, in the neighbouring little town of Oppenheim, also on the Rhine. Professor von Schmidt has been requested to submit by May 15 next a complete set of plans of the Cathedral in its present state, along with another set showing his suggestions for the completion of the structure, together with estimates of cost. Most of our readers need not be reminded that the building is one of the most interesting cathedrals on the Rhine. It is mostly in the Romanesque style of the twelfth century, the dimensions being 423 ft. by 87 ft. by a height of 105 ft. in the nave; it has four towers, two domes, and a double choir, and abounds with rich carving. It is to be hoped that any work done on the existing portions will be confined to necessary repairs, or Worms will cease to be "a Romanesque Cathedral."

IN a report to the Local Government Board (July 9) on Diphtheria in the Halstead Registration District, Dr. Bruce Low observes that as far as regards insanitary circumstances, he could not find any trace of their influence in the production of the grave character of the disease. This is rather contrary to general belief and experience, and seems also somewhat at variance with a statement on another page of the same report, in regard to the St. Andrew's Infant School:—

"The St. Andrew's schools were built in 1876. They are of more modern construction than the other schools in the town. The boys' and girls' departments are in one block, side by side, but the infants have a separate building. This consists of a large and well-lighted class-room, 50 ft. by 20 ft., and a smaller room 20 ft. by 18 ft., entered from the larger. The height to the beam in both class-rooms is 13 ft. 6 in. The smaller room, when I visited it in the absence of the children during the dinner-hour, felt close and smelt 'stuffy,' although the windows were open at the time. The ventilation of this smaller class-room is effected by opening the two windows on its north side, and the ventilator which is fixed between them. The fireplace is on the east side, while there are no openings on the west and south walls except the door in the latter at the angle where the east and south walls meet, and which door gives access to the larger room. So that unless the wind is blowing from the north, and the class-room door is open, there is no through ventilation of the smaller room. To this circumstance I attributed the closeness of the apartment when I entered it. [The contagion of diphtheria has been thought to cling with great tenacity to the walls and woodwork of infected rooms, and if the vigour of this poison can be enhanced by closeness of the atmosphere in which it is suspended, there is the more need that schoolrooms should be freely ventilated.] Cases of diphtheria kept cropping up during 1888, in connexion with this infant school, up to the harvest holidays. Advantage was taken of the recess to have the woodwork revarnished, the walls colour-washed, and the ceiling whitewashed; though not with a view to destroy contagion, since connexion between the school and the cases had not then been recognised. After this 'doing up' of the school, not a single case of diphtheria occurred in Halstead subsequent to its re-opening, so far at least as I have heard up to the present date."

This seems, at all events, a pretty clear case of connexion between "insanitary circumstances" and diphtheria.

AS a matter of course, everyone of our readers knows something of the battle of Prestonpans, where the "Young Cavalier" won his first battle, so graphically described in the pages of "Waverley." It is there recorded that General Gardner (a prototype of General Gordon) fell mortally wounded within sight of his family mansion-house, which still exists, and in front of which there was recently erected a monument to his memory, which may be seen by any passenger travelling by the North British Railway. This monument is open and visible to all; but within a few hundred yards of it there is another, more ancient and of vastly greater æsthetic interest, which is hidden within what is now claimed as private property. The market-cross of Preston (or, as it is called in ancient writs, *Salt Preston*) originally stood in the centre of the village common. Some of the houses of the square surrounding the common were, it is said, demolished during the present century, but all traces of the square have now disappeared, although some outlying portions of the village still remain which possess distinctive architectural character, and indicate that

* The manufacturing agent for England is Mr. G. Jennings. In connexion with the subject of this "Note," we would refer our readers to an article in the *Builder* for December 8, 1888, giving a description and plan of a public douche bath in Frankfort.

the village was one of some importance. The market cross now stands within a walled garden, and until lately free access has been given to it, but it appears from letters in the *Scotsman* that the right of the public to be admitted to inspect the cross is now disputed by the parties in possession. The market cross in question is the most interesting of its class in Scotland, bearing a family likeness to the erased market cross of Edinburgh, a copy of which was a few years ago erected at the cost of Mr. Gladstone. The question as to how this interesting relic came to be claimed as private property is worthy of investigation. It may possibly have been erected by the feudal superior on his own lands, but it would be well that the matter were made clear and beyond doubt.

WE much regret to learn, from a paragraph in a local paper, as well as from an architectural correspondent in the neighbourhood, that the Office of Works has been carrying out a scraping-down and renovating of the Lion Gate at Hampton Court, to make it look "as good as new." There may be some necessary repairs to be executed; but unless this is the case, and if the operations have been directed, as we are informed, to the scraping-off the weathered surface and giving a new raw surface, nothing could be more stupid both in an æsthetic and practical sense. The tones arising from age form part of the beauty of an old structure; and not only so, but the weathered surface is a preservative, and the scraping of it is often the prelude to further decay. If the Office of Works does not know this, it is only one more proof how exceedingly unfit an authority it is to be entrusted with the care of national buildings.

AN architect writes to complain to us, in regard to the competition for a new Market Hall at Swansea, that five sets of drawings, out of fifty-one sent in, were selected to go before a professional adjudicator recommended by the Institute of Architects. Our correspondent, who was a competitor, asks who selected the five, and what is the value of a professional adjudication on a small selection only of the drawings sent in. We do not know the details of this particular case, but as a matter of general principle we certainly think that the assistance of a professional referee is a mere farce if he is only to express an opinion on a few designs picked out for him, instead of seeing the whole. This criticism does not, at all events, lose point from the fact (as given in a local paper) that among the five designs selected by the local authorities to go before the adjudicator, *four* were by Swansea architects! The adjudicator was Mr. Alexander Graham, whose probity and ability in such an office are equally beyond question. Did he know the *facts*?

LETTER FROM PARIS.

THE holiday time has brought a greater number of visitors than ever to the Exhibition, but the closing-in of the days has led to an alteration of hours, and the buildings, from September 1, are closed at 5.30 and the grounds at 10.30; while the luminous fountain show commences at 8 instead of 9. Nothing has been definitely said as yet about the closing of the Exhibition, but it is expected it will be at the end of October: indeed the weather would probably not admit of a longer duration.

A new Buddhist pagoda has recently been erected on the Esplanade des Invalides, a construction in carved wood, executed at Hanoï, and rebuilt here under the direction of M. Lichtenfelder, architect. This small edifice, made of iron-wood from the forests of Annam, has a façade with some admirably-carved panels. The interior, which is extremely simple, is ornamented with figures of idols arranged pyramid fashion, and with some paintings executed by Annamite artists. Its general aspect is very original, and it effectively completes the little collection of exotic constructions in the Colonial Exhibition.

In the Champ de Mars the only novelty is the erection of M. Chipiez's restored model of the Parthenon, in the Palais des Arts Libéraux, which has been executed after the design and under the direction of M. Chipiez by a clever decorative sculptor, M. Jolly, who has been commissioned by the Municipality to produce models of several of the principal buildings erected in Paris during the last ten years. The model is intended for the Art Museum of New York.

M. Meissonier has been appointed president of the International Jury of Awards in Group I. (Beaux-Arts); M. Rohmann, president of the Russian Committee, and M. Henrique Melida, president of the Spanish Committee, are appointed vice-presidents in the same group. The general secretary is M. Eugène Guillaume, sculptor and member of the Institut. Another piece of news is that the general catalogue of the retrospective exhibition of French art has at last appeared; late enough in the day, certainly, but it is a rather valuable document now that it has appeared.

The official inauguration of the new Sorbonne took place early in August. We gave a view of one façade in the *Builder* for June 26, 1886. The completed façade looks exceedingly well, but unfortunately cannot be advantageously seen, owing to the narrowness of the street which it faces. There are now eight statues decorating this façade, representing Chemistry, Natural History, Physical Science, Mathematics, History, Geography, Philosophy, and Archæology. The statues flanking the entrance, representing Science and Literature, are respectively the work of M. Mercié and M. Chapu. The gateway of this façade opens on a large vestibule, in which stands on the left the statue of Archimedes by M. Falguière, and on the right that of Homer by M. Delaplanche. Four staircases lead from this vestibule; the end ones lead to the study rooms and the official apartments of the Sorbonne. Those which rise from the centre are state staircases, of monumental character and with balustrades of wrought iron with ornaments in repoussé brass-work. Like those of the Opera House, they describe a double circuit before landing in a large atrium, which is decorated by MM. Chartran and Flameng with the large compositions which have been exhibited in recent Salons. From this atrium opens the large council room, decorated with the design by M. Benjamin Constant, which was illustrated in the *Builder* for September 1, 1888. Between the two staircases is the entrance to the grand lecture-hall, which, in regard both to its plan and decoration, is the most interesting portion of the interior. It seats 3,000 persons, and forms a semi-circle, with five tribunes, each in two stages. Opposite the semi-circle, and behind the chair, is the immense composition by M. Puvis de Chavannes exhibited in 1887, and illustrated in the *Builder* for July 2 of the same year. Above this picture the wall is divided into panels adorned with escutcheons and palms. The ceiling is decorated by M. Galland, with allegorical figures in medallions, and in niches between the tribunes are six statues representing Descartes, Richelieu, Pascal, Lavoisier, Rollin, and Robert Sorbon. That of Lavoisier, a very remarkable work, is by M. Dalou. The hall is lighted from a cupola filled with stained-glass, and in the evening by lights with powerful reflectors in the ceiling: the whole is warmed by steam-pipes, which also assist the circulation of the air for ventilation.

This portion of the Sorbonne, of which the first stone was laid in 1885, has cost seven millions of francs. It represents about one-third of the total reconstruction, and it remains now to complete the building for the Faculté des Sciences (commenced about a year ago), and to execute that for the Faculté des Lettres, which will enclose the Church of the Sorbonne on its site. The architect has determined to preserve intact this interesting monument, containing the tomb of Richelieu, surmounted by the remarkable group in marble, representing the Cardinal in the arms of Religion, a group sculptured by Girardon from the designs of Lebrun.

On the occasion of the inauguration, M. Puvis de Chavannes received the degree of Commander in the Legion of Honour, a distinction which might be regarded with satisfaction by every one as a well-deserved honour, after a long career, to a painter who is certainly one of the most original geniuses in modern French art. However, like some other distinguished artists, M. de Chavannes has his detractors as well as his admirers, who lose no opportunity of testifying against him, and have reproached the Government with neglecting to have this honour to the artist ratified by the superior jury of the Exposition des Beaux-Arts:—a merely formal objection made to do duty for the occasion.

The inauguration is announced to take place very shortly of the new Bourse de Commerce, which is in reality an enlargement and transformation of the old Halle aux Blés. It is M. Blondel, the architect of the Hôtel Continental, who has effected this metamorphosis, to the regret of all archæologists and lovers of old Paris, but which has had at all events one excellent result in leading to the sanitary improvement of one of the most crowded quarters of Paris, and giving new and better approaches to the Halles Centrales. As to the building itself, of which the purely architectural portion offers little for remark, the interior decoration is somewhat incomprehensible. Generally, in the case of a Municipal edifice, the architect has to submit a programme to a Commission des Beaux-Arts, who give it their approval and sanction the selection of artists suggested. M. Blondel, however, set at nought this custom, and himself entrusted the decoration to MM. Luminais, Lucas, Laugée, and Clairin. This has resulted in a decoration complicated and out of keeping, fatiguing to the eye, which symbolises nothing and has no relation to the objects of the building. In fact, it is a complete failure both in idea and decorative effect.

The official inauguration of M. Dalou's monument of the Triumph of the Republic (an illustration of which was published some years ago in the *Builder*), on the Place de la Nation, is fixed for the 21st of this month, the anniversary of the proclamation of the Republic in 1792. M. Carnot will preside on the occasion, when it is expected that some special mark of distinction will be conferred on the artist.

There has just been completed on the Place de Fontenoy, behind the École Militaire, a monument raised by subscription to the memory of officers and soldiers who have fallen in battle. The monument is simply a pyramid, very lofty and very massive, with nothing but a few mouldings for ornament, and bearing various commemorative inscriptions. It is surrounded by a grille executed in wrought iron. On the Place de St. Augustin the pedestal has been commenced for the monument to Alfred de Musset mentioned in our last letter, and of which the sculptural portion is to be executed by M. Falguière and M. Mercié. Lastly, in virtue of a recent authorisation of the Municipal Council, the statue to the memory of Alphonse de Neuville is to be erected in the square situated at the angle of the Boulevard Pereire and the Rue Brémontier. This posthumous homage is due to a subscription organised among the numerous artists inhabiting the quarter of the Plaine Monceaux.

M. Fremiet's second statue of Joan of Arc, of which the *Builder* recently gave an illustration, has been the object of a great deal of contention. Philadelphia wished to acquire it for her museum; Lorraine desires to possess it, and two committees for this purpose have been formed, one at Nancy, the other at Paris. The latter committee, which includes some leading artistic and scientific notabilities, proposes to open a subscription for the casting of the work and its presentation to the town of Nancy.

We mentioned last month the result of the competition in painting for the Prix de Rome. That in architecture has since been settled. The subject, "A Casino at the Seaside," is purely modern, and certainly not academical in its suggestions. The jury, after examining the designs of ten competitors, declined to award the prize. They awarded, however, a "second grand prix" to M. Despradelle, pupil of M. Pascal, and a "deuxième second" to M. Morice, pupil of M. Blondel.

M. Casimir Echernier, architect at Lyons, has been named Chevalier of the Legion of Honour. He is a member of the Société Centrale des Architectes, and president of the Société Académique d'Architecture of Lyons. For the last two years M. Echernier has been nominated to preside at some of the meetings of the congress of architects at Paris, in which capacity he gave undoubted evidence of his ability and learning.

New English Church at Bergen.—A fund is being raised by the leading English residents at Bergen for the building of an English church in that city, the want of which is much felt during the tourist season. There is at present only one Anglican church in Norway,—viz., at Christiania.

THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION IN BRITTANY.*

Thursday, Aug. 15.—Excursion No. 1.

IT was intended at first that the excursion to Locmariaker should have been made by carriage from Auray, but it was found more convenient to hire a steamer to take the party by water from Vannes and land it at Auray in the evening. A glance at the map will show that the Gulf of the Morbihan is a sort of inland lake studded with innumerable islands. The gulf divides itself into two arms, the smaller one, on the west, running up towards Auray, and the larger one, on the east, towards Vannes. The two arms meet near Locmariaker, where the whole of the water from the interior discharges itself through a narrow opening into the Bay of Quiberon. This peculiar configuration of the land and sea causes very strong currents to generate between the various islands as the tide ebbs and flows.

The members of the Cambrian Archæological Association proceeded to the Quay at Vannes at nine o'clock in the morning, where, under the guidance of their President, M. le Dr. de Closmadeuc, they at once embarked on board a small steamer and commenced their voyage down the Gulf of the Morbihan. Coasting along the northern side of the gulf, and passing between the Ile aux Moines and the mainland, the island called Gavr' Inis (or Goat's Island) was reached shortly before eleven o'clock. Here it was necessary to land in small boats six or seven at a time, there being no pier of any kind. The run of the tide between Gavr' Inis and a small rock called the Ile des Tisserands was very strong, reminding many of us of the race between St. David's Head and Ramsey Island, in Pembrokeshire, with its green sea and lines of white foam. Gavr' Inis is the property of M. le Dr. de Closmadeuc, so that it was with no small pride that he conducted the members to the foot of the tumulus to which the island owes its celebrity, and there discoursed upon the prehistoric sculptures of its chamber and gallery, to the great edification of his hearers. Candles having been procured, the party were enabled to examine the interior. The only pre-historic monuments of the kind in Great Britain which are at all comparable with the chambered cairn on Gavr' Inis are the Hill of Dowth, in Ireland, or Maeshowe, in Orkney. Unfortunately, all three of these tombs attracted the cupidity of treasure-seekers, probably at the time of the Viking invasions, so that when re-opened at a later period their contents was found to have been entirely removed. The tumulus on Gavr' Inis is the third largest in the Morbihan district, being exceeded in size only by the Butte de Tumiac, which was seen as a prominent object on the horizon on the voyage from Vannes, and Mont St. Michel at Carnac, visited on the following day. Its chief interest lies, however, not so much in the size of the mound as in the extraordinary nature of the sculpture with which the interior is decorated. The sides, roof, and floor chamber and passage are composed of separate slabs of granite, fifty-one in number. The total length of the passage and chamber is 15 mètres 45 centimètres. The slabs forming the sides of the passage and chamber and one of the slabs of the floor are sculptured, the roof and the rest of the floor being plain. The carving consists of a series of incised lines close together, having the general appearance of tattooing, or of the fine lines on the inside of the palm of the hand. Amongst the confusing labyrinth of lines, however, certain definite forms which occur on the other dolmens in the neighbourhood may be distinguished. In several cases sculptures of stone axe-heads may be seen. A curious and hitherto unexplained feature is a sort of double holdfast, or pair of stone loops, cut in the slab forming one side of the chamber. M. le Dr. de Closmadeuc exhibited a twelfth-century crucifix of bronze that had been found on the island. The sculptures at Gavr' Inis are engraved in the "Dictionnaire Archéologique de la Gaule," and a complete series of casts are deposited in the Museum at St. Germains, near Paris.

Having spent an hour on the island, the members returned to the steamer by aid of the small rowing-boat in which they had landed, and were not sorry to find that M. Rosignol, of the Hôtel du Dauphin, at Vannes, had provided a most excellent luncheon to fortify them for the labours of the rest of the day. At the conclusion of the luncheon, the President's health was proposed by the Venerable Archdeacon Thomas, and the toast responded to most enthusiastically. The steamer disembarked its passengers at the pier at Locmariaker, about two miles west of Gavr' Inis, at half-past twelve. The first object inspected was the chambered cairn of Mané-er-Hroëk (Mound of the Witch), also called the "Butte de César," which lies about a quarter of a mile south of the village. The chamber was opened in 1863 by M. René Galles, and in it were found the splendid series of polished stone axes, the stone ring, and "callais" or green turquoise necklaces that had been seen in the museum at Vannes the day before. Near the entrance was discovered a very remarkable sculptured slab, now placed within the chamber for greater security. It has upon it representations of ten stone axes with their handles, three figures shaped like a cattle-yoke, and a figure which M. le Dr. de Closmadeuc calls "scutiforme," somewhat resembling a bell in outline. This slab is particularly valuable, as giving examples of three of the figures that occur most frequently on the other dolmens in the same district, and the meaning of which must have had some significance beyond mere ornament. The chamber of Mané-er-Hroëk measures 12 ft. by 9 ft., and is 4 ft. high. The side walls are of dry rubble, but the roof and floor composed of slabs of granite.

The next visit was paid to the dolmen of Men-er-Réthual, also called Bé-er-Groah (or the Tomb of the Fairy), lying a short distance to the west of the village of Locmariaker. Its principal feature is the gigantic cap-stone of the chamber, measuring 27 ft. by 14 ft. 6 in., on the under surface of which is scultpured the "scutiforme" figure already seen on the slab at Mané-er-Hroëk. The scale of the sculpture may be gathered from the fact that the incised groove forming the outline is nearly 4 in. wide. This dolmen is surrounded by a low stone wall for protection, and the inscription cut on a small pillar proclaims it to be "La Propriété de L'État." Whilst examining the Men-er Réthual a long procession in honour of the Fête of the Assumption of the Virgin (August 15), led by priests in full vestments, passed by, chanting hymns and carrying banners and images. The whole ceremony was most impressive, and fully in character with the surroundings.

Skirting the west side of the village, and crossing over the road to Kerisper, the party reached a group of megalithic monuments about a quarter of a mile to the north of Locmariaker, that has probably not its equal anywhere else in Europe. In the centre of the group, on the west side of the road to Auray, is the Dolmen des Marchands, or Table de César, with the cap-stone and the tops of the supports showing above the ground, in consequence of the upper part of the mound having been removed. On the underside of the cap-stone is a beautifully-carved representation of a stone axe, with its handle complete, and on the end support is again to be seen the "scutiforme" figure already twice noticed, elaborately sculptured all over with rows of hook-like objects. The passage leading to the chamber or dolmen has been cleared out, and a stone post erected to show that it belongs to the State. A good deal of the ancient appearance of the rude stone monuments at Locmariaker has been destroyed by the cleaning up they have received at the hands of the French Government, but it is to be hoped that neither restorers or destroyers will be allowed to mar their beauty any further. Lying to the south of the Dolmen des Marchands, between it and the road to Kerisper, is a fallen menhir broken into three pieces. As the added lengths of the fragments amount to 67 ft. it must have been when erect the tallest menhir in France. The last monument examined was the Mané-Lud (or Mound of Cinders). It is an oval tumulus 260 ft. long by 160 ft. wide, containing a chamber, which was opened in 1864 by M. René Galles, but which is now inaccessible. At the west end of the tumulus and partially buried in it is a very fine dolmen, the largest cover stone of which measures 28 ft. by 16 ft. Eight of the supports are sculptured with figures similar to those already described, including the "scutiforme" object and the hafted axe.

Returning through the village to the pier, two slabs were noticed in the churchyard, one with an early cross on it, and the other having an illegible inscription, apparently of late date. There is nothing in the architecture of the church deserving of special mention.

The party left Locmariaker by the steamer at 4 p.m., and after a two hours' run up the river, arrived at Auray at 6 o'clock, in time to discuss the adventures of one of the most successful excursions of the meeting over the dinner-table.

Friday, Aug. 16.—Excursion No. 2.

On the preceding day ample opportunity was afforded at Gavr' Inis and Locmariaker for becoming acquainted with the decorative features of the dolmens, if the very rude attempts at sculptured ornament which they present can be so called. During this day's excursion the methods of construction and general arrangement of almost every type of megalithic monument were made clear by an examination of the prehistoric remains in the neighbourhood of Carnac. The carriages conveying the party left the Hôtel du Pavillon d'Enhaut at Auray at 10 a.m., taking the road to Plouharnel in a south-westerly direction. Nothing of any note was observed until reaching the point where the road from Ploemel to Carnac crosses the one from Auray to Plouharnel, at a distance of five miles from the former place. Not far beyond the cross-roads the members left the carriages, and walked across the fields a few hundred yards to the west to see the tumulus of Crucunny, which is surmounted by a menhir. It has never been properly opened. A fine view of the surrounding country was obtained from the summit.

To the north-east was observed the little village church of Coetatoux, to the south-east the great mound of Le Moustoir, and to the south that of Mont St. Michel at Carnac. The landscape is flat, but pleasantly varied by fir-trees, furze-bushes, and masses of purple heather. Whilst the archæologists were contemplating the memorials of the far distant past, the photographers of our party were busily engaged in taking a group of peasants winnowing corn by means of the slight breeze obtained by the increased altitude of the top of the mound above the surrounding plain. Professor Rhys, of Oxford, also took advantage of the opportunity to verify the oft-repeated statement that the Brétons can understand Welsh from its similarity to their own language, but his efforts were not altogether crowned with success. The next object examined was the dolmen of Keriaval, lying on the same side of the road as the tumulus of Crucunny, a little further on. It differed from those structures that had been seen previously in having a more complicated ground-plan, consisting of a passage with end and side chambers opening out of it. This dolmen was explored by M. le Dr. de Closmadeuc in 1866, and found to contain "calais" beads, flints, and fragments of seven urns.

Before getting into the carriages the party proceeded to the Mané-Kerioned, or Grottes de Grionec, a short distance beyond the dolmen of Keriaval, but on the opposite or north-west side of the road. There are three sepulchral chambers, which were originally covered by one mound, but the cover-stones are now laid bare. The grouping of the whole made it one of the best subjects of the kind from an artistic point of view that had been seen, so that cameras and sketch books were put into requisition without delay. Rubbings were also taken of the sculptures with which several of the supports of one of the chambers are adorned. The practice of outlining the incised lines of the carved figures with black chalk is much to be deprecated, although the eye of faith is often required to see them otherwise. These chambers were explored by M. le Dr. de Closmadeuc, in 1866, and, as in other cases, the contents deposited in the Museum at Vannes. Some notion of the extent of what M. F. Gaillard in his guide-book calls a "Très remarquable acquisition et restauration splendide de l'État," may be gathered from the fact that the mound now contains not three chambers, but four, the fourth having been transported bodily from a position 300 mètres to the north-east. After passing the point where the road branches off to Carnac, a short stop was made to look at the dolmen of Runesto, on the north-west side, which, like the last two mentioned, was cleared out in 1866, and has some cup markings on the under side of the cap-stone. Plouharnel, which is eight miles from Auray, was reached at a little before one o'clock, and an hour spent in admiring the exceedingly good museum of local antiquities at the Hôtel de Commerce. The collection contains a large number of stone celts, pottery from the dolmens, and two gold collars found in 1849 in one of the

* Concluded from p. 138, *ante*.

chambers of the Grottes de Roch Guyon, close to Plouharnel on the north-west.

At Plouharnel was also seen a form of Christian monument, called a "lech," of which there are other examples at Erdeven and elsewhere in Brittany. It consisted of a pillar of wrought granite, of octagonal cross section, with convex curved sides and tapering towards the top. Two of the faces bore incised crosses with arms having expanded ends. Opinions differed as to the date to be assigned to this pillar, some thinking it might be as early as the eighth century, and others that it was not more than two or three hundred years old. From Plouharnel the carriages took the party as far as the village of Le Mennec, half way to Carnac, passing the dolmen of Kergavat on the north-east side of the road. At Le Mennec every one got out to walk along the celebrated alignments of standing stones which commence at this point and run in a north-east direction for nearly two miles. The sight which burst upon the view on reaching the rising ground was certainly a very wonderful one. It is difficult to convey an adequate idea of the effect produced by finding oneself suddenly in the midst of a forest of upright stones of every conceivable shape and size, an experience quite novel to most of us, and it will be well to avoid the example of the reporter who begun by saying that a particular scene baffled description, and then calmly sat down to write several pages of copy on the subject. It would be out of place here to discuss the various theories that have been advanced to account for the origin of the Carnac alignments. The late Mr. James Fergusson believed them to have been erected to represent lines of warriors in battle array. Whatever may have been the reasons that influenced the designers of these avenues, the result is most impressive to the beholder, notwithstanding the restorations of the French Government, which were to be seen in "full blast." All the prostrate monoliths have been set up again, and the heather and loose stones removed from the area occupied by the alignments, entirely changing the whole aspect of the place from what it was some years ago,—most people will think for the worse. It was noticed, as a curious fact, how every one is naturally inclined, on taking a general *coup d'œil*, to over-estimate the actual number of the upright stones, as ascertained by counting. The alignments of Carnac are composed of three separate sets of standing stones, those of Le Mennec, of Kermario, and of Kerlescan.

After traversing the first two of these on foot, and noticing the dolmen of Kermario on the south of the second avenue, the members followed a path across the fields, in a south-east direction, to the chambered cairn of Kercado, lying in a fir wood on a hill-side. The key of the door and candles having been procured, the interior of the chamber and passage was examined. On the underside of the cover-stone of the chamber the sculpture of an axe in its handle was to be seen. This monument was particularly instructive as showing the way in which the chambers and galleries were composed of single slabs of granite, and the interstices filled in with rubble walling. The chamber is exceptionally large, especially with regard to its height, which is as much as 8 ft. It was opened by M. René Galles in 1863, and found to contain stone axes, pendants, flints, and pottery. The party now turned back towards Carnac, passing on the way the Roman villa of Bosseno, explored by Mr. Miln in 1875, and the great tumulus of Mont St. Michel, surmounted by a small chapel and a sculptured granite cross. The last visit was to Mr. Miln's valuable museum at Carnac, in which are deposited all the Gallo-Roman and Celtic antiquities discovered by him in his numerous explorations in the neighbourhood. The party reached Auray by carriage shortly after 7 p.m.

Saturday, Aug. 17.—Excursion No. 3.

Carriages were ready at 10 a.m. to convey the party to Erdeven, eight miles west of Auray. On the way several wayside crosses were passed, but none of them appeared to be of any great antiquity. The Château de Kerio, with a circular turret corbelled out at one of the angles of the building, as in the Scotch castles, received some attention. Many granite well-heads of curious design were observed, which would have been put down as Mediæval had not some of them a date within the present century inscribed on the top. Granite in this district assumes the appearance of age very rapidly. Just before entering the village of Erdeven at the east corner of the cemetery was seen a tapering octagonal granite pillars similar to the one at Plouharnel, but without any cross upon it.

Passing through Erdeven and taking the road south-east towards Plouharnel, the party soon arrived at the alignments of Kerzerbo, which, although in tolerably good preservation at the west end of the avenues of upright stones, are not nearly so well worth seeing as those near Carnac. The next object on the programme was the dolmen of Crucuno, lying about a quarter of a mile to the east of the road to Plouharnel, at a distance of two miles from Erdeven. This was by far the largest dolmen that had been seen, the chamber measuring 25 ft. by 15 ft. and 9 ft. high, one of the cap-stones being 27 ft. by 16 ft., and 2 ft. thick. It had served the purpose at one time of a stable, and had even been inhabited by man, like the cromlech described in Baring Gould's novel of "John Herring." The dolmen of Crucuno is surrounded by farm-houses, and from the back of these were seen a remarkable series of standing stones arranged in a rectangular form, and on the rising ground in the distance the dolmen of Mané-Groh. After walking to the road the party were taken in the carriages back again through Erdeven and on through Reis to the village of St. Cado, near the mouth of the Etel River, which is crossed a little lower down by a suspension bridge. It would be difficult to imagine anything more primitive than this quaint little Bréton fishing village, with its low granite houses built on the solid rock and seeming to form part and parcel of it. As we approached troops of children, arrayed in blue cotton frocks and bright-coloured handkerchiefs tied over their heads, came trooping out, making a merry clatter with their wooden sabots, to the great delight of our photographers, whose cameras were soon at work. The village is built on a point of land running out into the estuary of the Etel River, and it is connected with the island of St. Cado by a rude causeway of rubble masonry, said in Bradshaw's "Handbook" to be of Roman origin, but probably it is of much later date. A local tradition relates that the causeway was the work of the devil, who built it in one night for St. Cado, stipulating that he should receive as his reward the soul of the first pilgrim who crossed it. St. Cado cheated the fiend by sending his cat over as the first passenger, and a contest ensued, the marks of which are still visible on the rocks of the island. The members spent a couple of hours in looking at the chapel of St. Cado. The chancel arch and circular apse at the east end are Romanesque. To Welshmen the chief interest of the place lay in its association with St. Cado. On each side of the nave were seen two pictures, representing incidents in the life of the saint of late date, but extremely curious as showing in what veneration he is still held. Over each picture there is an explanatory inscription painted on the wall. In the first of these he is styled "Anglois de Nation, Prince de Glamorgant." There is a statue of St. Cado in the chapel covered with votive offerings in wax of arms, legs, &c., and wooden crutches. His tomb was also seen; and two wooden money-boxes, heavily clamped with iron, showed that the veneration of the saint was turned to practical account by his successors.

The day's excursion concluded with a visit to an early inscribed stone standing on the low ground close to the bridge half-way between Locoal and Mendon. The fine south doorway of Mendon Church was seen in passing. The inscribed stone is 7 ft. 6 in. high, round in cross section, and tapering towards the top. The letters are minuscules of the ninth or tenth century, similar to those found in the Saxon MSS. of the period. The inscription reads:—

CROUX PROSTLON

(The Cross of Prostion).

There are crosses incised on two faces, and bands of key-pattern ornament on the other two. This monument has been much disfigured by the inscription and other carving having been picked out with yellow paint. Close to the inscribed pillar there is a cross of much later date. Auray was reached at 6 p.m. The excursion was, perhaps, not of such absorbing interest as the two previous ones, but the objects seen were of a more varied nature.

The party left Auray on Saturday evening after the excursion and proceeded by train to Quimper, where comfortable quarters were obtained at the Hôtel de l'Epée.

Sunday, August 18.

The morning was spent in wandering through the picturesque streets of Quimper and admiring the views of the fine twin spires of the cathedral, which are seen to great advantage from almost any point, but more especially from the west with a foreground of over-hanging half-timbered houses. These spires are one of the most successful pieces of work executed from the designs of the late M. Viollet-le-Duc. The head-dresses and embroidered costumes of the peasantry are to be seen in greater perfection at Quimper than anywhere else in Brittany, and afford endless subjects for the artist's pencil.

In the afternoon a visit was paid by special invitation to the Château of Kernuz, near Pont l'Abbé, in order to inspect the extensive collection of antiquities belonging to the owner, M. du Chatellier, who is well known to archæologists as the author of "Les Époques Préhistoriques et Gauloises dans le Finistère," as well as of numerous valuable contributions to "Matériaux pour l'Histoire Primitive et Naturelle de l'Homme." M. du Chatellier's museum is admirably arranged in three large rooms in his château, and is one of the best private collections in France. It contains a vast number of polished stone implements and pottery discovered in excavating the dolmens in the neighbourhood. The objects which attracted most attention were a magnificent gold torque, from the Gaulish cemetery of Kervilfré; an artistically ornamented cinerary urn from Kélouer-en-Plouhinec; some exquisitely-formed arrowheads, one of rock crystal from the tumulus of Ker-hué-Bras; and a quern with a stone spindle and bar to carry the upper stone. In the garden of the château was seen a unique conical pillar, sculptured on four sides with figures of Mercury, &c., probably of the Gallo-Roman period. It was dug up at Kervadel-en-Plabennec. There were also in the grounds cup-marked stones from St. Urnel and Rengougat-en-Plovan.

The members were hospitably entertained to supper by M. du Chatellier, at the conclusion of which a speech of welcome to the Cambrian Archæological Association was made by the host. This was responded to by the President, M. le Docteur de Closmadeuc, and the health of the host proposed by the Venerable Archdeacon Thomas.

The Church of Pont l'Abbé was examined on the way to Kernuz. It has a fine rose window at the east end and a curious slated spire.

On returning to Quimper it was found that a sort of fair was going on in the town. Amongst the various shows was one entitled "Grand voyage à l'enfer, aller et retour sans fatigue et sans brulures." The entertainment turned out to be a puppet-show representing the doom of the wicked as depicted in mediæval MSS. The mouth of hell was a cauldron into which the various characters were thrown and forced down by a devil with a three-pronged fork, after their sins had been recapitulated and the doom of each pronounced at the sounding of a gong. The last character put into the cauldron was a lady of the demi-monde, who was stripped of each of her different articles of dress, one by one, amidst the jeers of the audience. A puff of flame arose from the cauldron, and she was gone to her just reward. The whole scene was almost an exact reproduction of the principal features of the "Doom" on the wall-painting at Chaldon Church, in Surrey, with the devils sawing a sinner in two in the foreground. This survival of the Mediæval mystery play was followed by the "Temptation of St. Anthony," also performed by marionettes, at the conclusion of which both the saint and his pig were taken up to heaven. The whole thing was intended to be perfectly serious, and nothing in the nature of buffoonery was introduced. The conventional methods of portraying the more important Scripture scenes seem to have been handed down even to the present century by means of the miracle plays, and the Bréton Calvaries, to be subsequently noticed on the excursions from Morlaix, are nothing more than representations in stone of the various episodes of the Christian drama made familiar to the popular mind by seeing them acted on the stage.

Monday, August 19.

The morning of this day was occupied by the railway journey to Morlaix, but there was sufficient time left in the afternoon to see some of the old houses in the town. Two very beautifully carved spiral staircases of the fifteenth century were visited, one in the Rue des Nobles,

No. 21, opposite the market, and the other in the Grand' Rue, No. 22. The carving is well executed, consisting of flamboyant ornament and panelling, and several figures of saints. The interior of the house in the Rue des Nobles is in a most disreputable and dirty condition, being let out in floors. It might with advantage be purchased by the municipal authorities and kept in proper repair. Some of the houses in the Grand' Rue have figures of saints carved on the brackets supporting the overhanging stories. The fronts of the houses in the Rue des Halles are all slated and in their way quite as picturesque as the half-timbered ones. The water-pipes standing out a long way beyond the faces of the houses and inclined in all sorts of directions have a peculiar effect. One of the finest of the half-timbered houses is opposite the market. The bottom stories of most of these houses are of stone, with unglazed windows for the display of goods in the shops, taking one back in imagination to the state of things that existed in London before the Great Fire.

Tuesday, Aug. 20.—Excursion No. 4.

This day's excursion was made by train, the party leaving Morlaix at 8.54 a.m., and arriving at St. Pol de Léon, fifteen miles north, at 9.38. Here the party was placed under the guidance of M. Pol de Courcy, who led the way first to the Cathedral. He pointed out some twelfth-century walling on the outside of the south transept, as being the oldest part of the building now remaining, and drew attention to a gallery high up above the rose window where excommunicated persons were banished in former times, through a small door. The west front was then looked at from the market-place. It is flanked by two towers of the thirteenth century, with lancet windows, and surmounted by tall granite spires. Entering the Cathedral by the west door a good view was obtained of the interior, which is one of the finest in Brittany. The nave arcades and triforium are of white Caen stone. This part of the Cathedral is of the thirteenth century, and the details are worthy of careful study by the architect. Against the wall of the south aisle of the nave is a remarkable granite coffin, now used as a holy water vessel. The cover has disappeared, but, according to a writer of the seventeenth century, it bore the following inscription in ancient characters,—

"HIC JACET CONANUS BRITONUM REX."

The style of the ornament on the sarcophagus is that of the eleventh or twelfth century, so that it cannot possibly be the tomb of Conan Mériadec, the first king of the Brétons, who is supposed to have lived in the fourth century. Even the very existence of Conan Mériadec is doubted. As a work of art, however, this stone coffin is deserving of notice. It is 7 ft. 8 in. long, by 2 ft. 5 in. wide, by 2 ft. deep, outside measurement. The two sides are ornamented with arcades of five round arches springing from stepped capitals, like those seen in Saxon churches in England. On the east end is a cross, and on the west end a conventional tree. The carving is in very low relief, but well executed. After the reputed tomb of Conan Mériadec, the most interesting thing seen in the cathedral from an archæological point of view, was the Bell of King Marc. "Bradshaw's Guide" refers to it somewhat contemptuously as "a sort of old sheep bell," and even the photographer of our party said he would not throw away a plate upon it. This ancient relic is a quadrangular ecclesiastical bell of a type only found in districts where the Celtic church once held its sway. According to a legend, St. Pol had in vain asked King Marc to give him a bell he had in his palace, but one day the head of a great fish, caught off the Ile de Batz, was brought to the saint with the very same bell in its mouth. Like other relics of the Celtic Church, it is supposed to possess, even at the present day, the miraculous property of curing diseases of the head and ears. The bell is of yellow bronze, with a loop-handle at the top, fixed with two rivets at each side. The handle is ornamented with leaf-like terminations where it joins the bell, and has traces of silver plating and rows of small circles stamped on it. The relic is kept under a stone canopy near an altar on the south side of the cathedral.

The next place visited was the Church of Notre Dame de Kreizker, a building of the fourteenth century, with a good south porch and a splendid spire 80 mètres high, which Vauban said was one of the boldest pieces of architecture he had ever seen. Like Boston Stump, in Lincolnshire, it forms a prominent landmark in a flat country. It was gratifying to our national pride to learn that the design of the Kreizker is attributed to an Englishman, brought over by Mary of England, the first wife of Duc Jean IV., in 1362. The interior presents no special feature of interest.

Before adjourning to lunch at the Hôtel de France, a short time was spent in walking through the cemetery. Here were seen several curious little boxes, looking like diminutive dog-kennels, in which the skulls of deceased persons are placed a certain time after their deaths, when the bodies are exhumed. These boxes do not open, but are pierced with a heart-shaped hole in the front, and bear an inscription such as the following:—

"ICI GIT JEANNET PRIGENT MORTE 1868."

The gables of the boxes are usually surmounted by a small cross.

In the afternoon the party took the train to Roscoff, a pretty little watering-place three miles to the north of St. Pol de Léon. Here were seen a large allée couverte, the ruined chapel dedicated to St. Ninian, by Mary Queen of Scots, in 1548; some interesting fourteenth-century alabaster carvings of Scripture subjects in the church; and several old houses with granite carvings. Morlaix was reached at 8 p.m. by train.

Wednesday, Aug. 21.—Excursion No. 5.

The members left the Hôtel de Provence at Morlaix, in carriages, at 10 a.m., and, after a drive of about eight miles south-west, reached St. Thégonnec. The country in the neighbourhood of Morlaix, although not mountainous, is intersected by steep ravines in many places, giving the French engineers ample opportunity for displaying their skill in the lofty granite viaducts, by which the railway crosses these obstacles, and the well-planned course of the roads ascending out of or descending into the hollows at a uniform easy incline. The viaduct over the valley in which Morlaix is situated is a splendid piece of work, executed from the designs of M. Fenoux. It is 280 mètres long and 64 mètres high, constructed with two tiers of semi-circular arches one above the other. Mr. Ruskin would be probably gratified to learn that in this particular instance the railway has added to the beauty of the place, instead of destroying it.

An hour or more was devoted to seeing the Church and Calvary of St. Thégonnec. The Calvary is in the churchyard, on the south side. The base is rectangular, 10 ft. 7 in. long, by 4 ft. 7 in. wide, and 6 ft. high. On the west side of the pedestal is a niche containing an image of St. Thégonnec, who is represented with a small cart drawn by a pair of oxen, at his feet, to indicate his being the patron of cattle. Below this figure is an altar, supported on a bracket. On the top of the pedestal, going the whole way round, are a large number of figures arranged in groups, each representing a different scene from the Passion of our Lord, after the ancient conventional fashion of the Mediæval MSS., but with costumes of the seventeenth century. From the centre of the pedestal rises a lofty crucifix, the lower part of which is carved to look like the stem of a tree, and on each side is a shorter cross with the Two Thieves. Two pairs of brackets project from the central crucifix, the upper ones supporting two soldiers on horseback, and the lower ones, St. Peter and another Saint. Below the crucified Saviour is the Virgin and Child, and the date, 1610. The whole is carved in Kersanton stone, which is of a dark olive-green colour, and takes a beautifully smooth surface, when dressed with the sculptor's chisel. The quarries whence this material is obtained are near Brest. It is a volcanic rock, like the serpentine at the Lizard in Cornwall. The art of the sculpture is not particularly good, the size of the heads being out of proportion with the bodies, but the grouping of the figures and the general conception is to be admired. The great interest of these curious calvaries is, however, that they show to what a late period the Mediæval religious ideas that found their expression in the illuminated pages of the early MSS., and which were afterwards popularised by the miracle plays, and such books as the "Speculum Humanæ Salvationis," have survived in Brittany. Those who would pursue this subject further should consult Miss Stokes's edition of Didron's "Christian Iconography."

The Church of St. Thégonnec is chiefly in the Renaissance style of the seventeenth century. Some Queen Anne enthusiast might see hidden beauties in its monstrous details and it is not impossible that he might feel inclined to reproduce portions of the exterior in pink terra-cotta, as the façade of a club in Northumberland-avenue, or a music-hall in the Strand; but to a refined taste it seemed to be architecture run mad. A silver-gilt processional cross of considerable merit, of the same date and style as the Calvary, was shown in the inside of the church.

The afternoon was devoted to an inspection of the church and Calvary of Guimillian, five miles south-west of St. Thégonnec. The base of this Calvary, instead of being rectangular, like the last, is octagonal, with four rectangular projections. The crucifix is lower, and, in addition to the statues on the top of the pedestal, there is a frieze of sculptured subjects in high relief running round the whole just below the cornice. The scenes are taken from the early portion of the life of Christ and the Passion. At the four corners are the Evangelists with their symbols. There are two dates on this Calvary,—1581 and 1588. At the south-west angle is a very extraordinary subject, which is explained by the local legend of Catel Gollet. The sculpture shows the nude figure of a woman being dragged down into the open mouth of hell by three demons. The legend relates that Catel Gollet was a woman of dissolute life, who was condemned to this terrible doom for having concealed a mortal sin at confession.

The chief feature of interest in the Church is the south porch, with an ossuary containing skull-boxes at the west side of it.

The porch is ornamented with a very archaic series of sculptures of scenes from the Old and New Testament, executed in low relief in Kersanton stone. The style of the architecture is Renaissance, but the feeling of the carving Gothic. Amongst other subjects depicted are the Drunkenness of Noah, and Adam at work with a very primitive form of spade. Inside the porch, on the west side, are two curious carved plaques, one representing the Creation, with Eve coming out of Adam's side, and the other the Casting-out of an Evil Spirit, which is seen coming out of the top of the head of the possessed.

The date given on the outside of the porch is 1611 and on the inside 1606. Altogether, this is a very marvellous piece of work, worthy of being fully illustrated. The church has a good bell-gable at the west-end, combined with a tower.

Thursday, August 22nd.—Excursion No. 6.

The members left Morlaix for Lannion by an early train, going viâ Plouaret, and arriving at their destination shortly before 11 a.m. A few old houses were seen driving up from the railway station to the Hôtel de L'Europe, one in the market-place with an elaborately slated front being rather out of the common. Carriages were ready at one o'clock to convey the party to Perros Guirec, seven miles north. Some of the members walked up a steep hill opposite the town of Lannion to examine the Church of Brélévenez, joining the carriages further down the road. The church has a twelfth-century apse at the end, and a south porch of the same date. The holy-water stoup on the west side of the south door, inside, has an inscription in Lombardic letters upon it, showing that the original purpose for which it had been intended was a corn measure, used when collecting the ecclesiastical tithes.

At Perros Guirec a visit was paid, by special invitation, to the house of M. Renan (the author of "La Vie de Jésus"), where the members of the Cambrian Archæological Association were introduced to their host by Professor J. Rhys, of Oxford. M. Renan then delivered an address of welcome, in which he touched upon the intimate connexion formerly existing between Brittany and Wales. He mentioned that his own name was connected with that of St. Ronan, and he chaffed the Roman Catholic Church good humouredly for trying to boycott the Celtic saints in Brittany whenever a chance occurred. He said that the statue of St. Buzec was a case in point, as it had quite recently been replaced by an image of the Virgin from Lourdes. M. Renan referred to the law of Edward the Confessor, which enjoined Englishmen always to treat a Breton as a citizen worthy of all respect on account of his kinship with the Welsh, and he expressed a hope that this excellent statute had never been repealed.

M. Renan hospitably entertained the members to afternoon tea, and accompanied them after-

wards to the churches of Perros Guirec and Notre Dame de la Clarté. The former is one of the oldest and most interesting of all the churches that had been seen during the different excursions. It is Romanesque in style, with some late insertions. The south doorway is of the twelfth century, very much like those in some of the village churches in England. The tympanum and the capitals of the three columns on each side of the doorway are sculptured with figure subjects. On the tympanum is Christ in Glory giving the benediction, within an aureole, and with the lion of St. Mark on one side and the eagle of St. John on the other. On the capitals are two warriors, one armed with a sword and kite-shaped shield, fighting a dragon; a beast swallowing a man; a bishop with his crozier; St. Peter with his key; a man playing a stringed instrument with a bow, and a woman dancing head downwards in front of him; and a man with a bird. In the interior the nave has an arcade on the north and south sides of six round-headed arches, supported on five cylindrical pillars, with capitals sculptured with figure subjects. The meaning of these subjects is rather obscure, but the well-known Christian symbol of a pair of doves drinking out of a vase occurs on one of the capitals. There is in the church a quaint holy water vessel, the bowl of which is grasped by three grotesque figures of men.

Leaving Perros Guirec, the carriages took the road to Ploumanac'h, the members enjoying the magnificent sea views on the way.

A short stop was made at the top of the hill overlooking Ploumanac'h to inspect the church of Nôtre Dame de la Clarté. The square tower is placed diagonally with regard to the nave. It is of red granite, and has a spire. The building is of the fifteenth century, and not particularly remarkable in any way. M. Renan here kindly submitted to have his portrait taken, by the two photographers of the party. He was taken standing against the church, much to the apparent disgust of some Roman Catholic priests, who were passing at the time.

From the hill on which the church stands an extensive tract of country lying along the sea-coast was to be seen strewn in all directions with hugh boulders of red granite, piled up one above the other, as on Dartmoor, the whole aspect of the landscape being exceedingly sombre and melancholy. The village of Ploumanac'h lay below close to the sea. A short drive brought the party into the midst of an extraordinary jumble of rocks and houses mixed together indiscriminately, just beyond which, on the edge of a sandy bay, was the shrine of St. Guirec, a structure of the twelfth century, supported on four Romanesque columns, and built up at the back so as to look like a boat placed on end. The wooden image of the saint within is covered with holes made by pins stuck into his body for superstitious purposes. This shrine was engraved some time back in the *English Illustrated Magazine*, and the accompanying letterpress gave an excellent idea of the surrounding scenery.

This was the last object visited, and Lannion was reached at about 7 p.m.

On the following day (Friday, Aug. 23) the party returned, viâ St. Malo, to England.

In concluding the account of this most successful gathering, a word of praise must be given to Messrs. Thomas Cook & Son, and their agent, M. Dossé, for the very creditable way in which the whole of the arrangements connected with the hotels, railway journeys, and carriage excursions were carried out, without a hitch of any kind.

THE HERALDRY OF THE CRUSADES.

IF heraldry does not owe its very origin to the Crusades (and the question is an open one), it is undoubtedly indebted to that source for a great development, and for many bearings of vast interest. In fact, there are few of our ancient families who do not show in their shields some evidence of an ancestor having taken part in the Holy Wars or a pilgrimage.

In those superstitious ages the soldiers of the Cross were led to believe that if they died while fighting for the faith the gates of Paradise were open to them. The survivors who should succeed in slaying "a Saracen gentleman" became thenceforth of gentle blood, and allowed to bear a coat of arms.

Palestine was almost an unknown land, and marvellous tales were told of the country by warriors and pilgrims alike, and it is considered that many of the mythical monsters of heraldry arose from the wondrous accounts brought home by these veracious travellers.

But our present purpose is not to deal with this strange menagerie of "fearful wild fowl," but with well-authenticated figures of Eastern birth.

Sir Walter Raleigh, in his "Remaines," says:—

> "Give me my scallop-shell of quiet,
> My staff of faith to walk upon;
> My scrip of joy, immortal diet;
> My bottle of salvation;
> My gown of glory (hope's true gage),
> And thus I'll make my pilgrimage."

The escallop-shell was the badge of the pilgrim, who generally carried it in his hat; nor was it a mere distinguishing mark for the wearer, for as a cup, a dish, and a spoon at times it became an article of great utility on the way. So highly esteemed did this shell become that it is recorded the use of it was forbidden by Pope Alexander IV. to any pilgrim who was not of noble birth, and that he issued a bull to that effect.

From Moule we learn that the escallop is to be found in the arms of the Dukes of Bedford, Marlborough, and Montrose; in the arms of the Earls of Jersey, Spencer, Clarendone, Albermarle, and Bandon, the Marquis Townshend, and Viscount Sidney; and in those of many others of high rank. As an allusive bearing it is used by the families of Pilgrim and Dishington, and as a punning one by the baronial house of Scales, or De Eschales, of Middleton Castle, Norfolk, and also as the crest of this latter.

The escallop is also known as the shell of Saint James, it being his emblem or cognisance. The badge of this order is a red cross forming a sword, charged with a white escallop-shell; the motto is "Rubet ensis sanguine Arabum," meaning that the blade is red with Moorish blood, and has reference to the legend of the saint appearing at the battle of Clavijo on a white horse, and assisting at the slaughter of 60,000 Moors who fell on that occasion. So powerful did this order of knighthood become that it was able to exercise great influence in Spain, and at one time could bring a hundred thousand men-at-arms into the field.

But a still greater honour was destined for the shell, according to Fuller, who, in his "History of the Holy War," says:—"I find an order of knights called equites cochlearos, wearing belike cockle or scallop shells, belonging to them who had done good sea service, especially in the Holy War." Many Hollanders who took part in the siege of Damietta were admitted into this order.

The staff, or bourdon, is found in the arms of Palmer of Lincolnshire, and is borne with a hook at the head. The Tasboroughs of Suffolk bear staves with pouches hanging on them.

The scrip, or pilgrim's pouch, is charged on the shield of the Palmers of Kent.

By the bottle we may conclude Sir Walter Raleigh refers to the water bouget or bucket, a leathern utensil for carrying water over the dry, sandy deserts of the East. This forms a very interesting charge in heraldry, and is, perhaps, best known as the Bourchier badge, whose arms are thoroughly Eastern in their origin, viz., "*Argent*, a cross engrailed *gules*, between four water-bougets *sable*. Crest, the bust of a Saracen king, with a long cap and coronet all proper." Ellen J. Millington says the combat which this crest is designed to commemorate formed the subject of a painting once to be seen in the Manor House of Newton, at Little Dunmow, Essex.

The form of the bouget varies greatly, and Lower gives us six examples in his "Curiosities of Heraldry" (some of them are very grotesque), and Planché mentions that on the Norman font in Hook Norton Church, Oxfordshire, is a rude sculpture showing the manner in which it was carried.

In the Temple Church, on the shield of a crossed-legged effigy of a knight of the period of Edward I., three water-bougets are plainly sculptured. The figure is supposed to represent a De Ros, from this being the cognisance of that family; and thus, as Fuller quaintly observes, "many a dumb monument, which through time or sacrilege hath lost its tongue,—the epitaph,—yet hath made such signs by the escutcheons about it, that antiquaries have understood who lay there intombed."

According to Planché, the Trusbuts, Barons of Wartre in Holderness, introduced the water-bouget into English armoury; they bore "Trois bouts d'eau," three bouts or bougets of water, thereby symbolising both their family name and their baronial estate. A De Ros married the heiress of the Trusbuts, and took their arms, as was usual, and they are now more generally known as the coat of De Ros.

The star and crescent was one of the badges assumed by Cœur-de-Lion, doubtless to symbolise the ascendancy of the Star of Bethlehem over the horned moon or crescent of the Mahomedans, and this device appears on his first great seal, but it is also to be found on ancient Grecian coins, where it could have had no such significance. Among the symbols on the vaulting of the Temple Church is a cross standing on a crescent, and a star appears on each side of the former with doubtless the same meaning.

The Saracen's head is one of the best-known devices derived from the Crusades, being a favourite public-house sign. It is borne both black and red on the shield and as a crest, and is generally depicted as the head of a savage old man. The Morisons of Fife have three Saracens' heads on one neck. The head is naturally considered the most honourable part of the human frame that can be borne in heraldry, and some of our Welsh neighbours have Englishmen's heads on the family escutcheon. Blackamoors' heads, satyrs' heads, and even fiends' heads are not unknown in heraldry.

The crowned heart of the Douglas family comes within the scope of this paper, for it was assumed by an ancestor of the house who had undertaken the perilous task of conveying the heart of Robert Bruce to the Holy Land, for burial there, in 1328. The crown is generally considered to be a later addition.

The besant represents a gold coin of Byzantium of great value, and was probably introduced into heraldry from the Crusades. Richard Plantaganet, King of the Romans and Earl of Cornwall (son of King John), had for arms a lion rampant *gules* (on a field *argent*) crowned *or*, within a border *sable* besanty. (From the "Oxford Glossary.")

Planché was of opinion that the border of this shield was charged with peas (*pois*) of gold, being the arms of *Poitiers* or *Poicton*. Many Cornish families incorporated the besants or golden peas into their arms because Richard was the earl of their county.

Amongst the arms of Queen's College, Cambridge, we find an interesting charge,—that of the Cross of Jerusalem borne in commemoration of Margaret of Anjou, its founder. The cross is derived from the Queen's father, who was titular King of Sicily and Jerusalem.

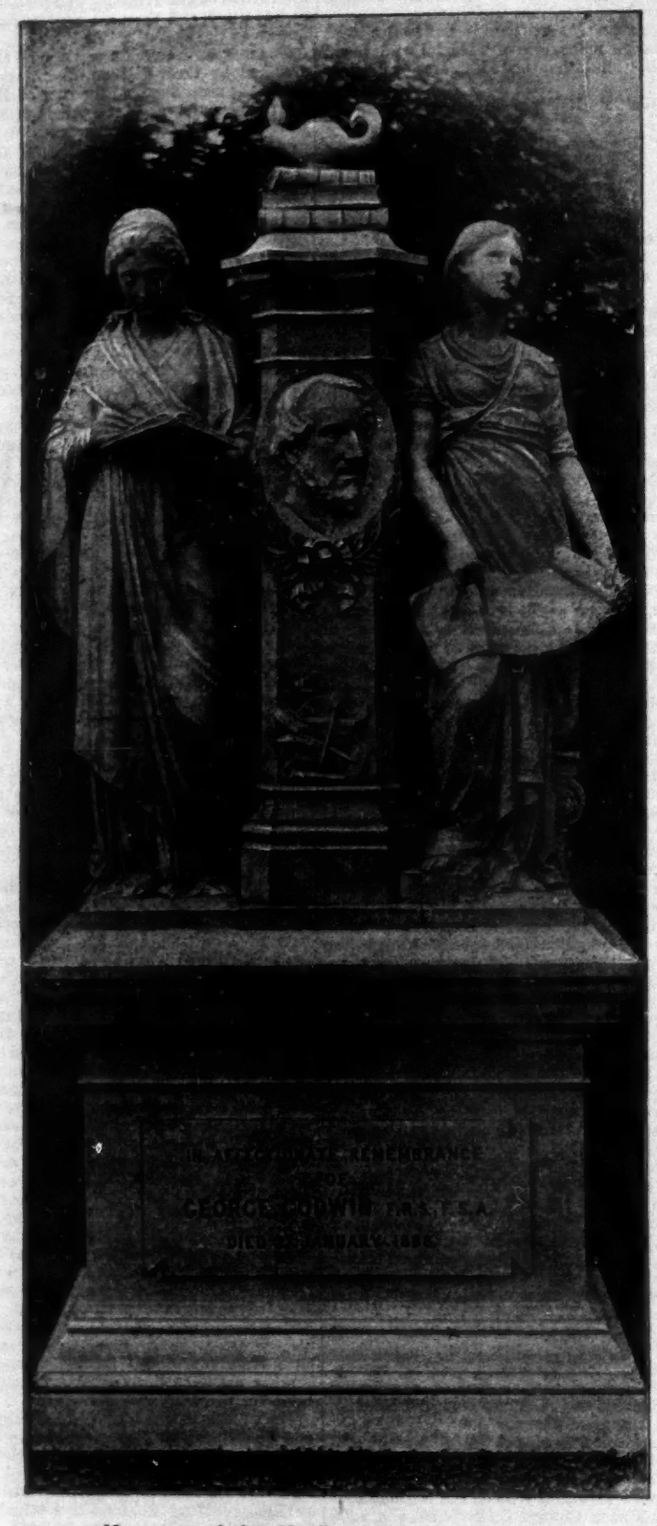
The term "chequy," "checky," or "chequer" bearing is applied to a shield or bearing divided into squares resembling a draught or chess-board, and is borne *or* and *azure* by Warren, the ancient Earls of Surrey. The idea may have been derived from this game of chess, which was revived by the Crusaders on their return to Europe, although they were not the original introducers of it. The Stewards of Scotland bear *or*, a fesse chequy *argent* and *azure*; this is a coat of an allusive nature, the fesse represents the steward's board. The "Oxford Glossary" says that the chequers still frequently seen at the doors of taverns have the same origin, but Planché reminds us that such a device is to be found in all countries, and at all periods, and may be regarded as a mere fanciful ornament.

The term *gules* (signifying red) is said to be derived from the Arabic *gule*, a rose, and to have been introduced by the Crusaders, but another probable derivation is from *gula*, the Latin for throat.

The wreath on which the crest usually appears was doubtless copied at the Crusades from the twisted turbans of the Saracens. Sir John de Harsich used this in 1384.

In 1380 an order of knighthood was founded by Richard II. of England and Charles VI. of France. It was called the Passion of Jesus Christ, and was instituted for the recovery of the Holy Land. The badge was a plain red cross edged with gold and charged with an Agnus Dei. The garment was white. The order was to have consisted of one thousand knights, each attended by an esquire and three men-at-arms.

The Swedish Building Stone Industry.—Prices of hewn Swedish granite and other building stones being now very good abroad, a new company has been started to work the valuable quarries at Norrtelge, with a capital of 4,500*l*. The stone is to be cut by machinery, the foreign market being a special object of attention.



Monument to the late Mr. George Godwin, F.R.S., F.S.A., Editor of "The Builder" from 1844 to 1883.

MONUMENT TO THE LATE MR. GEORGE GODWIN.

The monument of which the accompanying illustration is given has been recently erected, by the relatives of the late Mr. George Godwin, over his burial-place in Brompton Cemetery.

The monument was designed and executed by Mr. Jas. Forsyth. It is, as will be seen, an endeavour to give to the monument a rather more special and definite meaning than is usually found in cemetery monuments. The figures on either side represent Literature and Architecture; the books and lamp on the top of the pedestal, and the pen and drawing instruments sculptured at the foot, are accessory to the same idea.

We should have given an illustration of the monument sooner, but the photograph first taken from it after erection was unavailable for reproducing from, owing to the light being partially intercepted by trees; and in the end Mr. Forsyth kindly undertook to finish up his original model completely for the purpose, and from this the illustration is taken.

Illustrations.

THE LIBRARY OF "THE PEOPLE'S PALACE."

It is seldom that the *motif* of a modern and Classic building is supplied by an ancient and Gothic one. But such, we are informed, has been the case with the library of the People's Palace at the East End of London, of which we give an illustration. The old kitchen at Durham, erected by Prior Forcer, A.D. 1368-1370, is an octagon of 36 ft. 8½ in. in diameter, and its singularity consists in the fact that the groin ribs embrace three bays of the octagon instead of four in each case, and produce at their intersection an excellent shape for the base of a lantern or top light. In his library at the People's Palace, which is much larger, being an octagon of 76 ft. 6 in., Mr. Robson has adopted the principle of the Durham kitchen, but translated the whole into the style of his building, giving broad flat panelled groin ribs instead of narrow chamfered ones, and throwing up against the vault large windows on each of the eight sides. The treatment has the advantage of giving excellent light and ventilation, and of leaving all the wall space available for books. The construction, of course, is of iron. The cost was 10,000*l.* The eight busts are the work of Mr. Verheyden. Mr. Softly was clerk of the works.

The drawing from which our illustration is reproduced was exhibited at the Royal Academy this year.

RATHFERN-ROAD BOARD SCHOOLS, CATFORD, S.E.

These schools were erected in 1887-8 by the School Board for London, from the designs of their Architect, Mr. Thomas J. Bailey, the contractor being Mr. Charles Wall, of Chelsea. They contain accommodation for a total number of 800 children, viz., 240 boys, 240 girls, 320 infants, with a "Centre" for instruction in cookery, as well as a caretaker's house, &c.

The school buildings proper consist of three distinct buildings, viz., a one-story block for infants, a two-story block for boys and girls, and a third block, containing cookery centre, with caretaker's apartments over.

The total cost of the whole was 9,132*l.* 11s. 7d.

The original drawing from which the illustration is taken was in the recent exhibition of the Royal Academy.

STAPLEFIELD PLACE, SUSSEX.

This house has been erected for the occasional occupation of the owner (Mr. A. S. Bicknell), at a cost of between three and four thousand pounds. The lower part of the walls is faced with rough-cast, and the upper part with local bright red tiles. The roofs are covered with brown Broseley tiles. Mr. F. T. Baggallay is the architect, and the contractors were Messrs. Longley & Co., of Crawley.

HOUSE AT SUDBURY.

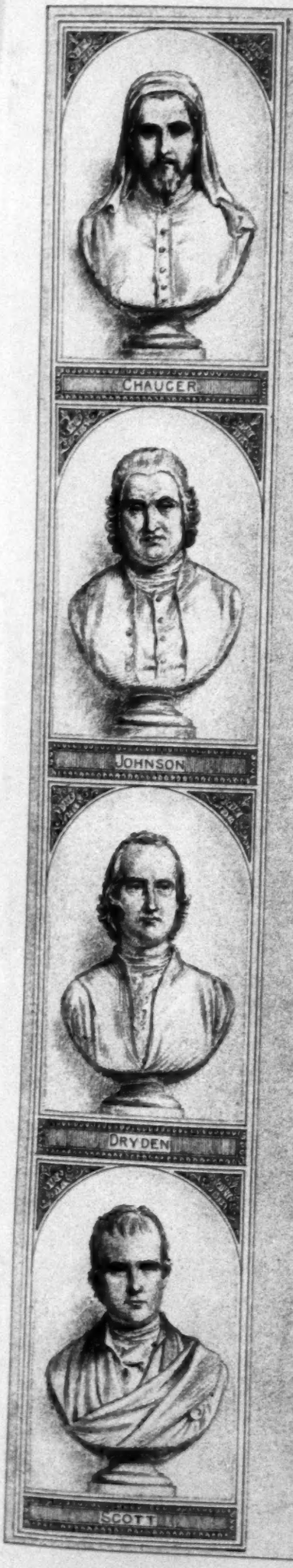
In addition to the accommodation shown on the ground-floor plan of this house, there are six bedrooms, three dressing-rooms and two servants' bedrooms on first-floor; and two bedrooms and a lumber-room in the attics.

The materials used are red bricks for the walls, with Corsham Down stone dressings, parts of the walls being tile-hung and the roofs tiled. The enriched gables are executed in cement. All internal finishings are very plain. The cost is 3,000*l.* The drawing was exhibited in this year's exhibition of the Royal Academy.

WINDOW, NEW JERUSALEM CHURCH, KENSINGTON.

This window, representing the incident in the walk to Emmaus given in St. Luke's Gospel, when the disciples said to Christ, "Abide with us, for it is toward evening and the day is far spent," has been designed by Mr. Camm for execution by Messrs. Winfields as a memorial window for the New Jerusalem Church, South Kensington. The pictorial portion is after a painting by Hoffmann.

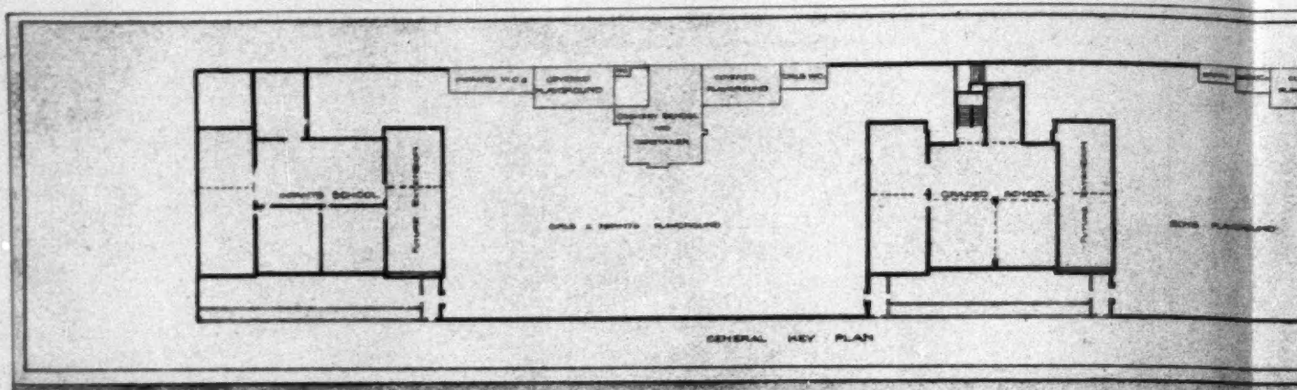
E.R. ROBSON, F.S.A.
ARCHITECT.


CHAUCER
JOHNSON
DRYDEN
SCOTT

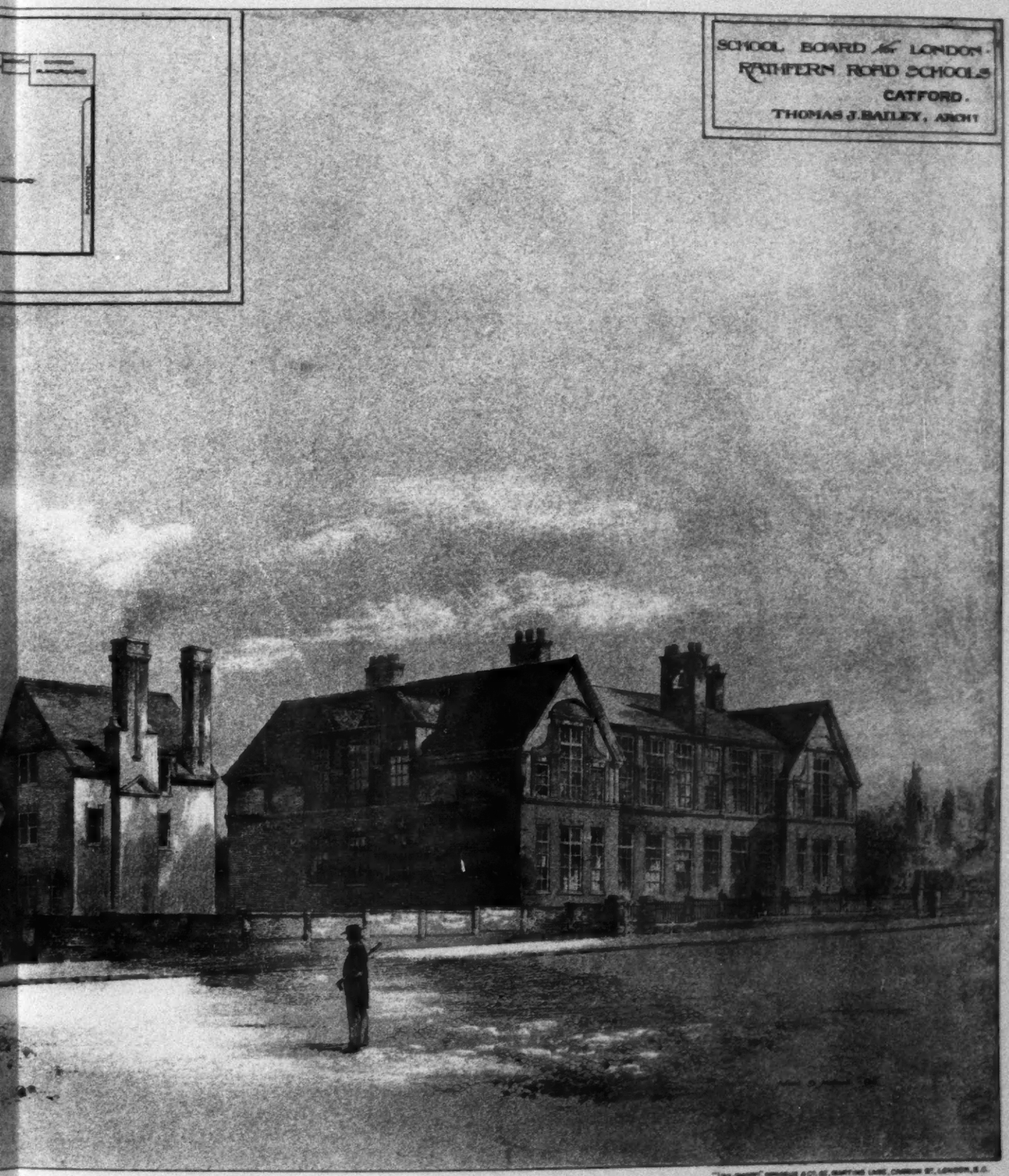
HOMER
THE PEOPLES PALACE
FOR EAST LONDON

PLATO
E.R. ROBSON, F.S.A.
ARCHITECT

SHAKESPEARE
MILTON
BYRON
WORDSWORTH



GENERAL KEY PLAN


SCHOOL BOARD for LONDON.
RATHFERN ROAD SCHOOLS
CATFORD.
THOMAS J. BAILEY, ARCHT

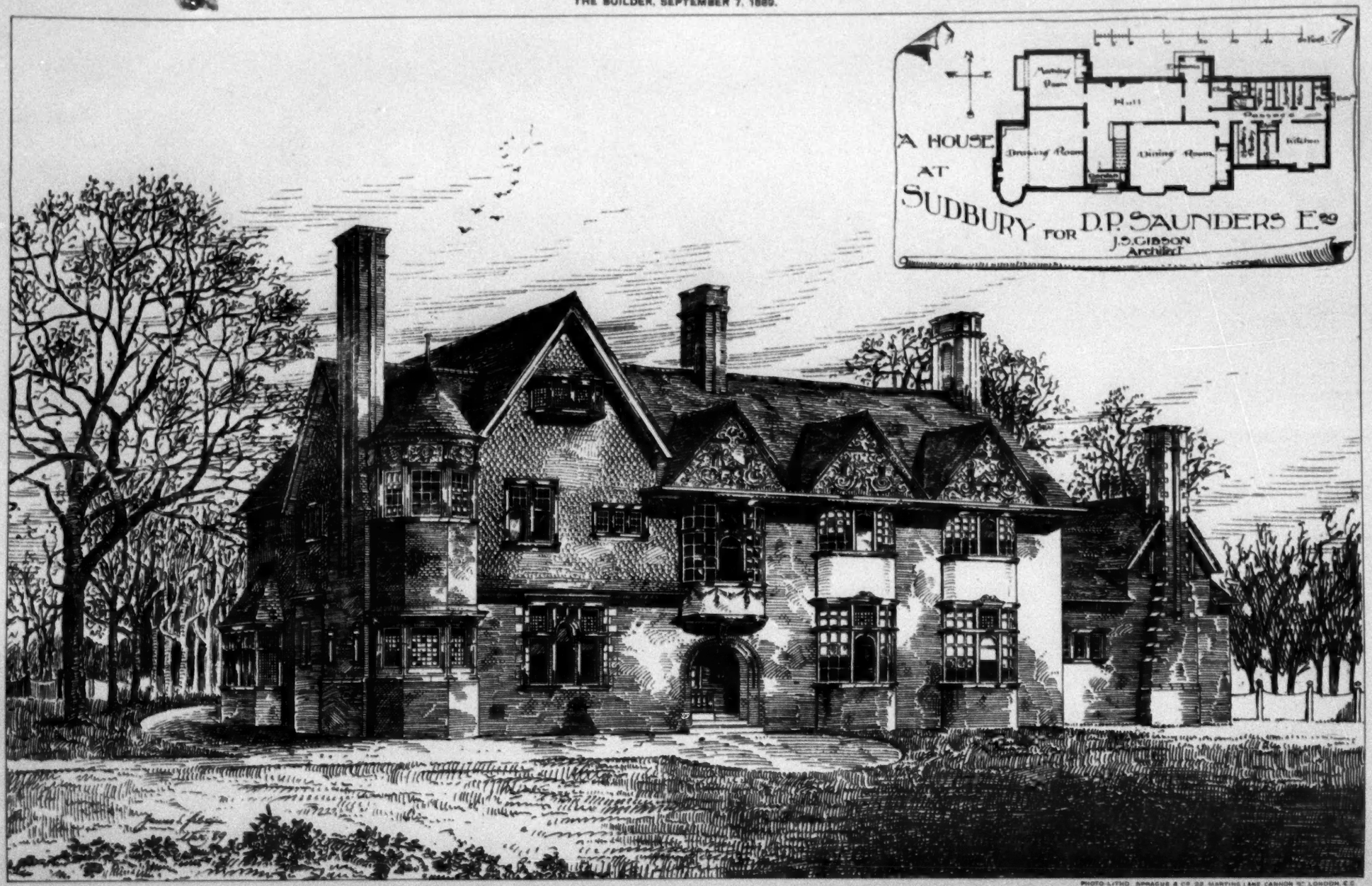
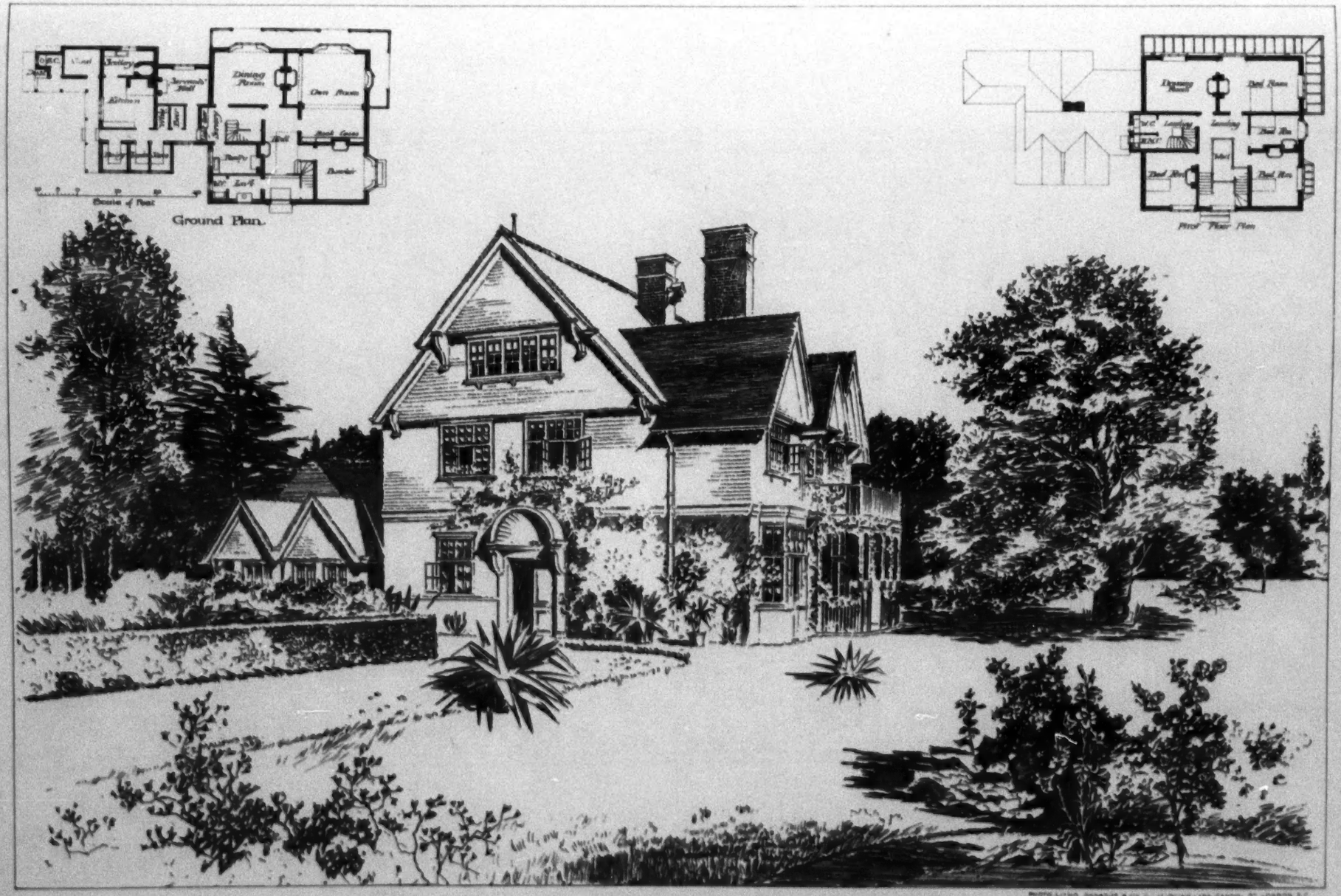


PHOTO-LITHO. SPRAGUE & CO. 22, MARTINS LANE, CANNON ST. LONDON, E.C.

PHOTO-LITHO SPRAGUE & Co 62 MARTINS LANE CANNON ST LONDON E.C.

HOUSE, STAPLEFIELD, SUSSEX.—Mr. F. T. Baggallay, F.R.I.B.A., Architect.



HOUSE, STAPLEFIELD, SUSSEX.—Mr. F. T. Baggallay, F.R.I.B.A., Architect.

STAINED GLASS WINDOW.—NEW JERUSALEM CHURCH, KENSINGTON.

DESIGNED BY MR. JAS. F. P. CAMM. EXECUTED BY MESSRS. WINFIELDS.

LONDON AND MIDDLESEX ARCHÆOLOGICAL SOCIETY.

COLCHESTER was the place selected for the annual excursion of this Society this year, and the excursion was made on Wednesday, August 28. It is thought that the Council are justified in penetrating beyond their former natural boundaries, as, by the rapid growth of London, Essex has now become one of the four metropolitan counties. Many of the members left London for Colchester by early trains, although the rendezvous was not announced to take place till 1.15 p.m., in the Castle library, under the presidency of Mr. E. J Sanders, the Mayor; but owing to His Worship's unavoidable absence, Mr. J. W. Butterworth, F.S.A., was voted to the chair. About fifty ladies and gentlemen assembled, including Professor T. Hayter Lewis, Mr. E. C. Robins, F.S.A., Mr. John Leighton, F.S.A., Mr. C. H. Shoppee, Mr. T. Milbourn (hon. secretary), and others. Mr. Butterworth commenced the proceedings by calling on Mr. H. Laver, F.S.A., to explain the objects of interest. Mr. Laver said that as he was to act as "showman" that day, he would begin by pointing out the Corporation regalia of Colchester, of which they were very proud; he next referred to the "loving cup," and the silver oyster which was the standard by which formerly the size of oysters were tested. He then described the town seals; the Mayor's seal was of very early period, not later than 1500. There were also on the table several of the early charters; one of them was dated 1362. Colchester was one of the earlier boroughs of the kingdom, and it was probably the oldest town in the kingdom. It certainly was a town before London was, and one of very considerable size, as the Romans had to have 30,000 or 40,000 men to take it. It was not so early chartered as Maldon. Many of the books in the library were very rare indeed. Mr. Laver next conducted the party to the museum, and pointed out the Roman and other objects of interest which are exhibited there, and which have been found in and around Colchester. He commenced with that curious piece of sculpture, "the Sphinx," and then the Roman altar, which latter has formed the subject of a very interesting paper by Mr. J. E. Price, F.S.A., and which has been published. After describing the stone coffins, coins, Roman pottery, &c., Mr. Laver proceeded to the large quadrangle of the Castle, which he said was probably the spot on which the whole of the Roman garrison in Colchester were slaughtered by order of Queen Boadicea. In the inner quadrangle, the dungeons were inspected, and the party then viewed the outside of the Castle, and the spot where Sir Charles Lucas and Sir George Lisle were shot by order of Fairfax. The execution of these two knights took place 240 years ago that day. For a more detailed and recent history of Colchester Castle we would refer our readers to the *Builder* of September 2, 1882. After visiting the Castle gardens, St. Helen's Chapel was next inspected. This building, like Rowland Hill's Chapel, London, seems to have undergone curious vicissitudes. Originally built as a place of worship, it became a school, and next a carriage-manufactory, and then a furniture dealer's, till it was purchased by Mr. Douglass Round, who restored it as a Churchhouse, and it was now used as such. It was dedicated to St. Helena, a British princess, native of Colchester, and mother to Constantine the Great. Passing through the town, the visitors noticed many quaint old houses, notably the old "Red Lion" inn, which will be found illustrated and described in the *Builder* of September 2, 1882. At St. Botolph's Priory, Mr. Laver said this was probably the earliest monastery of the Augustine friars in England. It was built in 1103. After the Dissolu- it became a parish church, and during the siege of Colchester by Fairfax it was nearly destroyed by cannon shot. This priory was constructed by Norman builders with Roman materials. The visitors lingered here for some time admiring the beautiful interlacing arcade at the western front, an illustration of which will be found in Parker's "Glossary." Arriving at St. John's Abbey gateway, Mr. Laver said the abbey was founded in 1096. After the Reformation it passed into the hands of the Lucas family, who built a house upon the grounds, which was destroyed by the Parliamentarians under Fairfax. The gateway was erected between 1413 and 1416, as stated in the borough records, and at the time of the siege was used as a battery. A gun was placed on the top to fire into the wall of the town. The last abbot held out against Henry VIII., but was captured through treachery and taken to Tyburn and executed. St. Giles's Church, close by, is the burial-place of the Lucas family. Here are interred the remains of the gallant Sir Charles Lucas and Sir George Lisle, whose melancholy fate is recorded on their common tomb. Following Mr. Laver, the entire party next proceeded to the venerable Saxon Holy Trinity Church. Mr. Laver said the tower was unquestionably Saxon, but the other parts of the church were comparatively modern. On the door of the south side of the church there was formerly attached a "sanctuary ring"; any one grasping that ring in former days was held to be within the sanctuary, and therefore safe. The Balkerne-gate, with the Roman arch, and other portions of the old Roman walls of the town, were next inspected. Mr. Laver then conducted the party to the museum of Mr. George Joslin, and pointed out an effigy of a Roman centurion,—perhaps the finest relic of Roman occupation found in Colchester; it bears an inscription to the effect that the centurion was Marcus Flavonius, son of Marcus of the Polian Tribe. Having inspected the other Roman relics there, the company passed a hearty vote of thanks to Mr. Joslin for his kind invitation.

COMPETITIONS.

Proposed Municipal Buildings, Sheffield.—The conditions of this competition have been issued. The total cost of the building is not to exceed 80,000*l.* From the sketch designs to be first sent in, the Corporation will select, with the advice of an Assessor, those which they most approve, not exceeding six in number, and will request their authors to supply complete designs. A sum of 600*l.* will be divided equally between the architects taking part in this final competition. The Corporation have requested Mr. Waterhouse, R.A., to act as Assessor.

Schools, Dartford.—The first premium in this competition has been awarded to the designs bearing the motto "School Architect," estimated to cost 4,200*l.* to execute. The author was found to be Mr. E. Pincher, West Bromwich. The second premium was awarded to the design bearing the motto "Invicta," by Mr. Horace T. Bonner, of London. There were fourteen other designs sent in.

Oundle Waterworks.—The Oundle Commissioners, having invited several engineers to send in competitive plans, at their meeting last Monday finally selected a water scheme drawn up by Mr. W. H. Radford, C.E., Nottingham, and, after receiving personal explanations as to details, they gave that gentleman instructions to commence boring operations at once. Mr. Radford reported that the owner of the estate had offered to give the necessary land for the works on condition that Biggin Hall and Biggin Grange are supplied with water free. Mr. Radford's scheme is to sink a deep well and pump the water from the Northampton sand to a summit reservoir, whence the town would be supplied by gravitation.

Paving New York Streets.—New York is regarded as the worst-paved city in the world, and this although large sums are spent in keeping the pavements in order. Quite recently, the New York Legislature sanctioned the spending of 3,000,000 dols., at the rate of 1,000,000 dols. per annum for the next three years. The new pavement will be partly asphalte laid on concrete, partly granite on concrete foundations, the latter to be in streets with heavy traffic. Permission has been granted by the Board of Estimate and Apportionment to the Commissioner of Public Works to appoint a special inspecting force, consisting of a consulting engineer, an assistant engineer, two transitmen, two levellers, four rodmen, one draughtsman, two skilled workmen, and four axemen, and the Comptroller has been further authorised to appoint an engineer to inspect the work before the contractors are paid. It remains to be seen whether a change for the better will be effected by the reforms introduced. At present the bad state of New York pavements has been due to two causes. In the first place, the work, although nominally in charge of engineers, has in effect been controlled by politicians. Next, the pavements are continually being torn up to lay and repair pipes and sewers, and we know ourselves from experience that, however thorough the work of repaving may be done, the original condition is never restored.

SURVEYORSHIPS.

Leicester.—We are informed that the Special Committee of the Leicester Corporation appointed to select a successor to Mr. Gordon (who has been appointed Chief Engineer to the London County Council) for the post of Borough Surveyor have reduced the number of applicants from forty-two to seven, the following being the seven:—Mr. J. P. Barber, Surveyor to the Vestry of St. Mary, Islington; Mr. J. W. Brown, Borough Surveyor, West Hartlepool; Mr. W. Harpur, Borough Surveyor, Cardiff; Mr. Jos. Lobley, Borough Surveyor, Hanley; Mr. Chas. Mason, Deputy Borough Surveyor, Leicester; Mr. E. G. Mawbey, City Surveyor, York; and Mr. Richard Read, City Surveyor, Gloucester. We understand that a Sub-Committee will visit the several towns named to personally see the work executed by the candidates.

Notts County Council.—We hear that, subject to the approval of the County Council, Mr. E. P. Hooley, A.M.I.C.E., was unanimously appointed County Surveyor, by the Highways Committee, on the 24th ult. There were 143 candidates, and eight selected.

OBITUARY.

Mr. Joseph Jennings, F.R.I.B.A.—One of the elder Fellows of the Institute (viz., the fourth by seniority, elected in 1847), Mr. Joseph Jennings, District Surveyor for South Saint Marylebone, died on the 6th inst., at his sister's residence at Wanstead, after a short illness. He was the second son of Mr. David Jennings, of the Hall House, Hawkhurst, in Kent, which had belonged to his family since about the year 1666. He was descended from Dr. Jennings, the author of "Jewish Antiquities," and connected with Dr. Nathaniel Lardner, author of "The Credibility of Gospel History," and with Daniel Neal, author of the "History of the Puritans." On his elder brother going abroad, he purchased the family estate, but afterwards found it more convenient for business requirements to reside at Tunbridge Wells. He was a pupil of the late Mr. Joseph Parkinson. In 1856-7 he designed and carried out the Depôt for the permanent staff of the Royal London Militia (now the 4th Battalion of the Royal Fusiliers) in the City-road, Finsbury, a plan and view of which are given in the *Builder*, vol. xv. [1857]. Mr. Jenninga was for many years Surveyor to the Commission of Lieutenancy of the City of London, an office which he resigned in 1882. He was also Surveyor to the Guardian Fire Office, and retained the appointment, as well as that of District Surveyor, after his retirement from practice, which occurred a few years ago. He had great practical knowledge, and was a member, and for some time Chairman, of the Board of Examiners appointed by the Institute under the provisions of the Metropolitan Building Act, 1855. He was elected a member of the Council in 1851, and until very recently took an active interest in the work of the Institute. Mr. Jennings had been for many years a director of the Architectural Union Company, and at his death had attained his eighty-third year.—*R.I.B.A. Journal of Proceedings* (Aug. 29, 1889).

Mr. J. F. B. Firth, M.P., died suddenly at Chamounix on Tuesday, his death being attributed to sunstroke. He was only 47 years of age. As Deputy-Chairman of the London County Council, an office to which he was a few months ago elected at a salary of 2,000*l.* a year, he was taking a very active part in the administration of London local affairs. Some years ago he wrote a bulky volume on the Municipal Government of London. He represented Haggerston on the County Council.

Hornsey Church.—The new parish church will be consecrated by the Bishop of London on November 2. The organ is being built by Messrs. H. Willis & Son, and will cost 2,000*l.* It has three manuals and 47 stops, and will be, it is said, the largest of its kind in that part of London. The church has been erected from the designs of Mr. James Brooks, and was the subject of an illustration in our pages on May 12, 1888.

Builders' Benevolent Institution.—The annual dinner of this Institution is announced for Thursday, November 7, at Carpenters' Hall, London-wall, the President, Mr. J. W. Hobbs, the present Mayor of Croydon, in the chair.

Residence, Marnaroneck-on-the-Sound, N.Y.—Mr. E. A. Sargent, Architect.

RESIDENCE, MARNARONECK-ON-THE-SOUND, N.Y.

This house, designed by Mr. E. A. Sargent, shows that American architects are becoming quite as expert as some English ones in the art of making a new house look (on paper at all events) like an old one. Apart from this consideration, the house is pretty and picturesque in effect.

THE TRADES UNION CONGRESS.

The twenty-second annual Trades Union Congress was opened on Monday last at Dundee. Shortly after 12 o'clock noon, Mr. George Shipton, the Chairman of the Parliamentary Committee, entered and took the chair amid applause. He was accompanied to the platform by the members of the committee, including Mr. Broadhurst, M.P., and Mr. Crawford, M.P. Mr. Fenwick, M.P.; Mr. John Wilson, ex-M.P.; and Mr. John Burnett, of the Board of Trade, were also present.

The Chairman, in his opening remarks, said that the Congress was more largely representative than any one that had ever preceded it. Up to that moment 210 delegates had been duly accredited to the Congress.

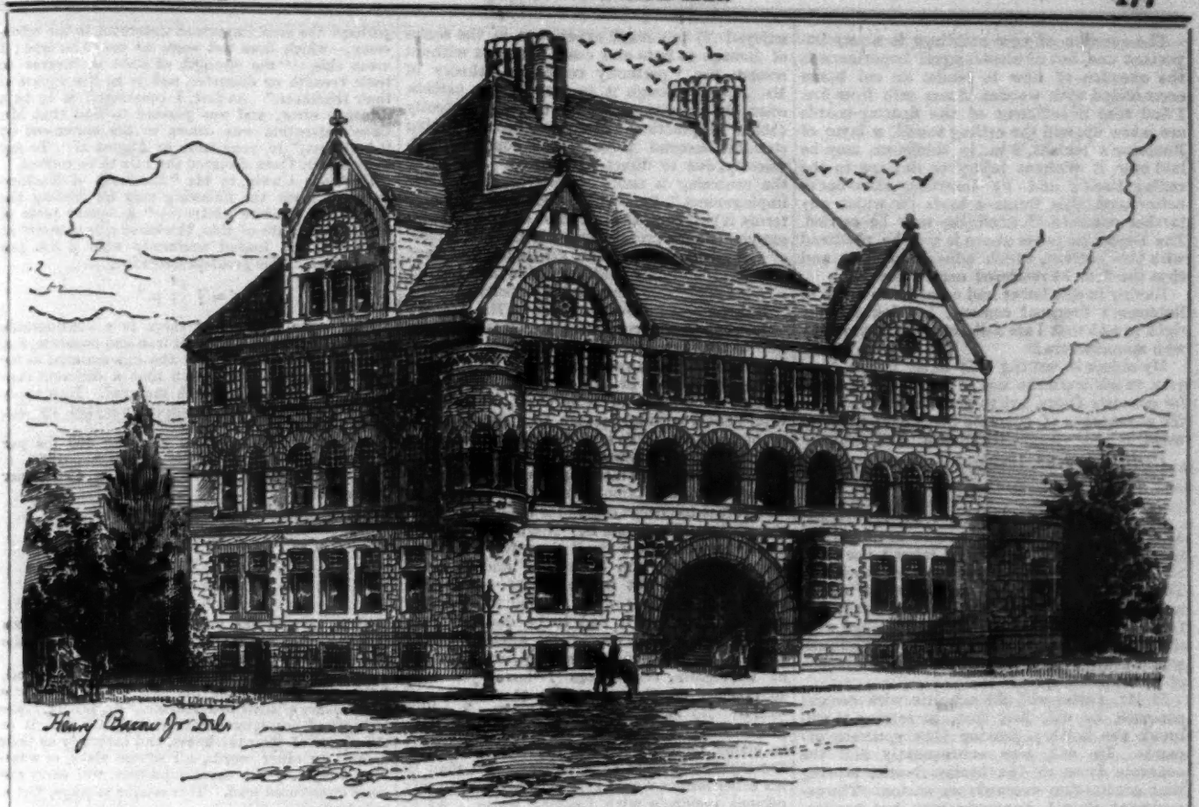
The officers for the Congress were then elected as follows:—President, R. D. B. Ritchie, secretary of the Dundee and District United Trades Council; Vice-President, Mr. Henry Tait, Glasgow; secretary, Mr. Robert Bruce, Dundee; tellers, Messrs. T. Corbett, Nottingham, and Mr. M. Arrandale, Manchester; treasurer, Mr. H. Slatter, Manchester; auditors, Messrs. W. H. Lambton, Durham, and J. T. Morrison, London.

Mr. Ritchie, the President of the Congress, having taken the chair, Mr. Broadhurst, M.P., rose to present the Parliamentary Committee's report. The report stated that the legislative events of the year, so far as they related to labour, had not been remarkable. Perhaps the chief subject of interest was still the Employers' Liability Bill. They would remember that at the time of last Congress the Government Bill was before the House of Commons for further consideration at the autumn session. The decision of Congress upon the measure, which was further strengthened by the great deputation of the trades that waited upon the Home Secretary and other members of the Government in November, led to an adverse motion against the Bill being moved by the Parliamentary Secretary in the House of Commons. Although that motion was defeated in numbers, yet its moral effect was so strong that the Bill was withdrawn, and had not been re-introduced. It was pardonable that some of the friends of labour should doubt the policy thus pursued; but the mind of the committee was perfectly clear as to its wisdom and ultimate value to the labouring classes. So far as the committee had been able to gather, it was the almost unanimous opinion of the great friendly societies that clause 3 of the Bill was fraught with great danger to their organisations; and at a meeting of these bodies held in London in the early part of the year, representing about two millions of members and about fourteen millions sterling in funds, the clause was severely condemned. That of itself formed a sufficient indictment against the injurious proposals. If the Government were now reconsidering the whole subject with a view to meeting the wishes of those chiefly concerned, the committee would not be disposed to be too critical as to the delay in the further consideration of the measure. The committee were pleased to be able to announce the passing of a Railway Regulation Bill, compelling all companies to adopt the block system, and to fit all passenger trains with continuous brakes. The report next dealt with the Cotton Cloth Factories Bill, in regard to which it is stated that for some years past the weavers of North-East Lancashire had complained of the pernicious system of adulterating cotton yarns, previous to being woven into cloth, which had necessitated the infusion of a considerable quantity of moisture into the atmosphere of the sheds in which the weavers work, to make the stiff, oversized yarns workable. This system had been carried on to such an extent that it had brought on the employed serious bodily ailments, sacrificing in many instances not only the permanent health but the lives of the operatives. With a view to remedying that state of things, the Congress last year instructed the committee to bring the matter before Parliament. The committee gave the question its fullest consideration, and agreed to leave the details of the measure in the hands of the representatives of the cotton operatives, with the result that a joint committee of seven M.P.'s and seven operatives was appointed to draft a Bill, which was read a first time on June 27, and the third time on August 14, a rate of progress without a precedent in the history of labour legislation. It was then sent to the Lords, who got through the Bill in quick time, and it received the Royal assent a few days ago. Although, owing to the opposition of employers, the measure was not quite all the committee should have liked, it was fairly satisfactory, as, in addition to limiting artificial moisture, there were clauses making proper ventilation imperative. The report next alluded to the Merchandise Marks Act Amendment Bill, introduced by Mr. Broadhurst; the Quarries Regulation Bill, the prospect of getting which passed was very remote, as the Government were strongly opposed to it; Mr. Baumann's Bill to give additional powers to inspectors of factories and workshops; the Enginemen's Certificate Bill, to be introduced next session; the Mining Royalties Commission; the London International Congress; and the International Labour Convention. The concluding portion of the report contained the following words:—We congratulate the Unions on the general improvement of trade throughout the United Kingdom, and are glad to know that the workers in some branches of industry have, by the aid of combination, succeeded in taking a share of the increased prosperity. We heartily hope that this tendency will continue and increase, but without strong unions this can only take place to a limited degree. This point raises anew the question of trade combination and its value or otherwise. If trade unions have failed, as some wish it to be believed, then they should be abolished, their membership scattered, their forces disbanded, and in the wilderness of chaos the workers should commence anew the search for the best means of protection and aid. If, on the contrary, as we believe to be the case, Trade Unionism has been enormously successful, and has placed the workers of this country in a superior position to that enjoyed by the workers of any Continental country where Unionism has never existed in any practical form; if it has raised the whole status of labour by making it a power and an influence in many of the affairs of State by giving it representatives in departments of the Government, as well as in Courts of Summary Jurisdiction; if mainly by its aid labour has found its way in a representative capacity into all parts of our local government system and educational institutions, then we unhesitatingly declare that he who seeks to sow dissensions in our ranks, by spreading false reports and by appealing to passions and prejudices, is an enemy to the cause of labour.

The balance-sheet of the Parliamentary Committee for the year shows a total charge of 1,054*l.* 4*s.* 8*d.*, including a balance of 160*l.* 2*s.* 11*d.* from the Bradford Congress, 637*l.* 2*s.* 2*d.* of subscriptions, and 140*l.* from delegates' fees. The expenditure amounted to 999*l.* 11*s.* 5½*d.*, leaving a balance to the good of 54*l.* 13*s.* 2½*d.*

The discussion of the Parliamentary Committee's report was adjourned.

In the afternoon the delegates enjoyed an



The Denver Club, Denver, Colorado.—Messrs. Varian & Sterner, Architects.

excursion on the Tay, and in the evening they were entertained to supper in the Kinnaird Hall.

On Tuesday, Mr. Ritchie, the President of the Congress, delivered his inaugural address. He said that in his opinion the present Congress would mark an epoch of importance in the history of Trades Unionism, if, indeed, it did not lead to a very large extension of its scope and aims. All who had devoted any attention to the industrial problem were quite cognizant of the fact that a spirit of discontent was steadily permeating the wage-earning classes. Political faddists had not been slow to take advantage of this, and had endeavoured to turn it to account to discredit the influence of Trades Unionism, which they found unfavourable to the propagation of their impracticable and Utopian schemes. It was, therefore, incumbent upon the society to consider and ascertain, if possible, the cause of the discontent and dissatisfaction with the existing state of things, and to suggest a remedy, in order that the solidarity of the labour party might be maintained. The chief causes of the discontent might, in his opinion, be attributed to insufficient and uncertain employment, the unequal distribution of the fruits of labour between the labourer and the capitalist, and the ever-increasing difficulty which the intelligent wage-earner experienced in attaining a competency. The misery which sprang from the first of these evils was incalculable. With regard to the remedies, limitation of the maximum day's work to eight hours by Parliamentary enactment was the most generally approved method by which it was proposed to provide employment for the surplus labour of the country, but in future legislation must be more comprehensive than in the past, embracing, as nearly as could be, all classes of wage-earners. No one would assume that the enactment of an eight hours' day would be a permanent adjustment of the social machine, but it was a step in the right direction. He hailed with the liveliest satisfaction the advance which had been made towards free education, and to a more perfect system of technical education. They must trust in great measure in education to enable them to keep abreast of other nations. What he hoped, and thought worth striving for, was that unionism should now begin to demand a larger share in the moulding of the national life. Wherever there was corporate existence, there let unionism make its voice heard and respected. He trusted that their deliberations at the congress might tend to bring capital and labour into closer harmony with each other, and to hasten the time when each should occupy its true place in the social economy, when their interests should be found to be identical, and when the good of all should be the aim of both.

THE DENVER CLUB, DENVER, COLORADO.

THIS club-house was built from the designs of Messrs. Varian & Sterner, architects, of Denver, Colorado.

It is built in grey and brown sandstone, with a tiled roof. The interior is finished in hard woods, the walls covered with stamped leather, and in parts finished with "combed work,"—a phrase which we presume refers to a method of plaster finish.

CONCRETE FLOORS.

SIR,—Those who have the interest of sound building at heart are much indebted to Mr. Caws for his valuable articles on "Concrete Floors," and for the letter thereby elicited from such a pioneer on the subject as Mr. Potter.

Having for the last ten years, wherever it was possible for me to do so, used concrete floors and staircases in buildings of every kind, I am satisfied that no difficulty, except that of cost, exists in building domestic houses in such a way as to be practically fireproof.

The essentials are that the floors, staircases, lintels to the windows, and the roofs shall be of materials that will resist any fire that can possibly be established within the building.

As to the cost, I have before me the tenders for the erection of a parsonage house amounting altogether to 2,162*l.*; the house is in the country, and is about three miles from a railway station. The difference in cost of concrete floors and iron joists against single-joisted combustible floors was 42*l.* 6*s.*, in this instance the small iron joists were spaced 2 ft. apart.

It appears to me that economy is to be effected in two or three ways; in the ironwork, as pointed out by Mr. Caws, in the centering, and probably in the cement itself.

Mr. Caws might have strengthened his argument as to the unnecessary use of iron by referring to concrete floors still existing in Rome. I will only refer to one quoted by Mr. Middleton ("Ancient Rome, 1885"), who states that the whole of one of the upper floors of the Atrium Vestæ consisted simply of a great slab of concrete 14 in. thick and about 20 ft. in span, merely supported at its edges by travertine corbels, there being no intermediate support whatever.

As to centering, it appears to me that if wood centering is to remain up for five weeks, it would stop all progress in the building of an ordinary dwelling-house for that time, and would militate against the adoption of concrete floors; but is that necessary? At Cannes, for instance, brick floors are formed which set in a day. And, if we refer again to Roman construction in concrete, we find that in it one of the first considerations was to economise all temporary aids. The evidence appears to me conclusive that in walls and arches erected by the Romans, they used cement of quick setting powers, which enabled them to build a skin, or case, or centre sufficiently stable to carry the core of the wall or arch until it set and was able to do its own work. I think we still have something to learn from them.

As to the cement itself, it appears to me that some form of gypsum or sulphate of lime, which has been used for centuries for floors wherever gypsum is to be found, is better adapted for this and all internal uses than Portland cement or carbonate of lime; and in its improved form of Robinson's fire-proof cement, I have found it an excellent material. It is more thoroughly fireproof, more soundproof, and requires considerably less water and sooner attains its ultimate strength than Portland cement.

This, however, may be tested by any one for himself.

With it I have formed all the floors in a large mill I have just erected, covering an area of half an acre, in which all the centres were struck within three days.

I think, however, that to economise in concrete floors, wood centering, which has many disadvantages, should, to a great extent, be dispensed with.

The concrete, when soft, might be carried on slabs of fibrous plaster, which, when set, would unite with them, and they would become an integral part of the construction.

The skeleton to carry wood staircases can easily be formed in concrete, and by using rolled-iron purlins 6 ft. apart or thereabouts, roofs may be similarly formed with concrete, finished in breeze, so that no laths are required, and the slates are nailed directly into the concrete.

The question of new buildings is a very important one, but of almost equal importance is the question of how to render an old house constructed with wooden floors safe from fire. I find that if sufficient of the flooring-boards are taken up, and the ceiling sound, a layer of Robinson's cement, 3 in. in thickness, may be laid over it without injury or damage to the ceiling itself; and by inserting skew-backs beforehand, this forms a basis on which any further concrete, if need be, may be carried. The beams or joists above it may be plastered with this cement, which adheres to wood, and thus the floor be rendered secure from fire.

Having in this letter had occasion to refer to Robinson's fireproof cement, I think it only right to add that I am a director of the company who manufacture it.

My object in writing this letter is not, however, to advocate the use of a special material for concrete floors, but to give my testimony to the advantages of concrete floors over those of wood.

CHARLES J. FERGUSON.

Carlisle, Aug. 28, 1889.

SIR,—I am sorry to differ from Mr. Hyatt, after his very kind reference to my contribution; but he appears to have missed the point of the passage which he quotes from my letter. The point was, not that the absence of shelliness in the fractures is a surprising fact (far from it); but that *if* horizontal cleavage were the cause of fracture, the presence of shelliness would prove it, and that therefore the absence of shelliness disproves it.

If Mr. Potter will fill a bottle with cement concrete, he will find that, in setting, it will break the bottle; proving that concrete expands. He will also subsequently find the concrete loose in the broken bottle, proving that contraction succeeds expansion. The experiment should be made with hot cement. But cool cement likewise expands, and contracts, though in less degree.

I should not have expected the expansion and contraction of the large slab Mr. Potter speaks of to visibly affect a brick-wall, as brickwork possesses considerable elasticity; take, for example, a factory chimney swaying in a storm like a poplar. And the inertia of a mass of flooring, 100 ft. long, would prevent expansion from so greatly extending its length as to throw end walls out of plumb.

But I can point to two cases in my own experience where the expansion of the concrete floor opened and slightly dislocated the joints of heavy stone cornices and string-bands; and in those same cases this expansion was followed by a degree of contraction.

I have for years proceeded on the plan recommended by Mr. Potter, *i.e.*, laying the floors first over the walls, and then building the walls higher upon the floors. I am at present doing a very extensive set of fireproof floors this way. It is undoubtedly the best method. But it is not always practicable. I have tried the other method of building the walls first, and putting the floors in afterwards. Where corbelled ledges could not well be formed in the walls for the floor edges to rest upon, I have built courses of brick in dry sand when the walls were carried up, and removed them piecemeal afterwards, as fast as required (and no faster), to insert the edges of the concrete flooring. I do not like this method, but it has its advantages sometimes. I have never known any mischief arise from it, but great care is needed in its exercise. The horizontal chases so formed should never be more than half-brick deep in recess, should never occur in a wall less than a brick and a half thick, and should not be continuous for lengths of more than, say, ten feet without intervention of solid pillars. I repeat I dislike such horizontal chases, and I shun them, but they are sometimes unavoidable, and must then be used with great judgment and caution.

Mr. Potter's remarks on the three-layer system are a little crude. The top and bottom layers, instead of being held "with little connexion or bond" to the middle layer, are practically homogeneous with it, by virtue of the great tenacity of the cement,—always provided that good material is used, and that not too much time is lost between layers. The homogeneity of floors thus cast in layers is much greater than that of girder flanges composed of several thin plates of iron rivetted together, and which we find so excellent in practice.

In passing to and fro under centreing dripping from the concrete being cast above I have enjoyed (?) too much experience in the shape of damage to hats and coats to accept without reserve the "perfectly colourless" theory of Mr. Potter, though it is true under certain scientific conditions which do not perfectly obtain in practice. Moreover, such dripping streams descend through the concrete with velocity, due to direct gravitation. But when the centreing is made watertight, the "gentle impingement" (as Mr. Potter very properly terms it) of concrete in course of setting is an extremely slow process, and any fluid reactions, or *pervasions*, due to such gentle impingement are correspondingly gentle and slow, and are not *streams* possessing appreciable velocity.

But the best answer I can give Mr. Potter's objections to waterproof centreings is to invite him to try them practically, as I have done, for he will in this way prove, as I have proved, the great superiority of the method. After my special experience of waterproof centreing, I would never willingly return to the non-waterproof method. This is a matter on which an ounce of practice is worth a ton of argument.

With regard to winter and summer work, I know one old and famous firm of cement paviors who refuse to accept orders for outside work in the winter. Their rule is, "Not after October." That firm once did a small floor for me, partially under cover, in November, and a severe frost on the night following its completion utterly spoilt their work, turned it soft, like mud, in parts, and it had to be done all over again. I am not prejudiced against winter work. The most important and extensive set of warehouse slab-floors I have yet done were many of them cast in the depths of winter. No harm came of it. But I much prefer for concrete work damp, mild weather, to either cold dry or hot dry. Humidity of atmosphere favours slow setting. No man in his sober senses would seriously propose to mix cement concrete with freezing water. As to straw and sacks for covering, they are very useful. But such frosts as sometimes turn the soil to iron, even spade deep, will not be baffled by straw and sack covers, and the wind often strips them off in spite of every care and precaution, and frost and tempest often work together. I have found the worst expansion cracks in slabs which during setting were exposed to the sun by day and the frost by night. Equability of temperature during setting is a great desideratum, not so obtainable in winter as in mild, humid weather.

FRANK CAWS.

SIR,—I was glad to see in your issue of Aug. 24 (p. 141), a letter from Mr. Frank Caws, admitting that terra-cotta is a more fireproof material than cement concrete. He is, however, mistaken about the cost of the system of construction described by me, and evidently cannot understand how it is possible to manufacture a permanent centering of terra-cotta or fire-clay, and fix it, at a price very little in advance of ordinary concrete. When I explain that this permanent centering not only saves wood centering, but also half the concrete, and that the simple process of manufacturing and fixing enables it to be done at about half the price of terra-cotta blocks, he will see the possibility of its use even for the commonest buildings. The advantages of the permanent over the removable centering is apparent to any one, for, with this system, the ceilings would be plastered, and the entire building nearly finished out in most cases while Mr. Caws was waiting for five weeks to expire before removing wood centering; as the concrete is not so great in bulk, the moisture dries out more rapidly, and the dead-weight of the floor is considerably reduced.

In ordinary dwelling houses, if concrete floors were substituted for wood, the saving in joists, lathing, and plaster (one coat) would not exceed 2s. 6d. per yard. Can Mr. Caws put in his cement concrete slabs (with or without iron) for that? I have a somewhat extended experience of Portland cement concrete in floors, and find that when gauged 4 to 1 and 6 in. thick, it costs with centering 4s. 6d. to 5s. per yard (without any iron), and then has to be done in fairly large quantities; if done as specified by Mr. Caws, it would cost considerably more.

I am glad to find Mr. Hyatt agreeing with me regarding the risk with concrete work in large slabs, and I, too, am touched in a tender spot by Mr. Potter's remarks, for my experiments and studies were originally those of an architect who had a desire to substitute for the fire-resisting systems in use a system that would be as nearly as possible fire proof.

MARK FAWCETT.

SIR,—It was with great pleasure that I read the two articles by Mr. Caws on concrete flooring, as the subject is one that is not yet fully understood. There is, however, one important statement,—perhaps the most important statement in the whole essay,—which does not seem to me to be true; I mean this,—"the strength of slabs is inverse to their breadth or diameter, and is as the square of their thickness." At first, I considered it to be a printer's error, and was pleased to find that Mr. Caws's attention was drawn to the statement by "Architect," in your issue of August 17. To my surprise Mr. Caws declared the rule to be correct.

Professor Unwin, in his "Elements of Machine Design," gives the following rule for finding the strength of flat-iron plates:—"A square plate of s inches in length of side, thickness t, is encastré at the edge, and loaded uniformly with p lbs. per square inch. The greatest stress is

$$f = \tfrac{1}{4}\,\frac{s^2}{t^2}\,p.$$"

I am quite aware that there is a considerable difference in the behaviour of iron and concrete, but the rule will hold good for the one material as for the other, with the exception that a different constant must be used for each material. Now apply this rule to the two examples adopted by Mr. Caws, namely:

(1) 1 ft. by 1 ft. by 1 in. carrying 400 lbs. per square foot.

(2) 10 ft. by 10 ft. by 1 in. carrying 40 lbs. per square foot.

We get the following results:—

$$(1)\ f = \tfrac{1}{4}\,\frac{12 \times 12}{1 \times 1}\,400 = 14{,}400.$$

$$(2)\ f = \tfrac{1}{4}\,\frac{120 \times 120}{1 \times 1}\,40 = 144{,}000.$$

That is to say, the stress in example (2) is ten times as great as that in example (1), whereas the stress ought to be the same in the two cases.

It seems, therefore, that the rule ought to read, "the strength of slabs [per square foot] is inverse to *the square of* their breadth, &c.," or, briefly, "the strength of any *square* slabs per square foot is as the square of their thickness, and inversely as their *area*." In other words, all square slabs, of whatever area, if of the same thickness, will carry the same distributed load. This sounds strange, but it may be true.

Will Mr. Caws, or some other reader, kindly state the rule for finding the proportion between central and distributed loads on square encastré slabs?

It may be interesting to your readers to know the relative strength of rectangular plates, as stated by Professor Unwin. Mr. Caws does not give any rule for it; but there is no doubt that in practice more oblong floors will be required than square ones. The rule is as follows:—

"A rectangular plate of thickness t, length l, and breadth b, is encastré at the edge, and loaded uniformly with p lbs. per square inch. The greatest stress is

$$f = \tfrac{1}{4}\,\frac{l^4}{l^4 + b^4}\,\frac{b^2}{t^2}\,p.$$"

GEORGE L. SUTCLIFFE.

September 3, 1889.

ST. MICHAEL'S CHURCH TOWER, COVENTRY.

SIR,—In connexion with the special point in the present discussion concerning the tower of the above church, I am not aware whether any mention has been made of the opinions of the architect who was originally consulted on the subject of its restoration, and with which, owing to circumstances, I happen to have become well acquainted, as follows:

It was in the year 1852 that the late Sir Gilbert (then Mr.) Scott was commissioned by the Coventry authorities to have accurate measurements taken of the whole of the above fabric, and to furnish a series of drawings, to scale, for its proposed restoration. In order practically to assist him in that matter, he selected the writer of this communication, who was then one of the staff in his office, and who, accordingly, undertook the work. While so engaged, upon one occasion when Sir Gilbert visited the church, our conversation turned upon the characteristics of the tower, and the unusual slenderness of its angle buttresses,—their projection above the plinth being only 5 ft., while their height, including the pinnacles, is very nearly 170 ft. He considered, however, that these buttresses must have been deliberately so planned from the first, inasmuch as the gradation in their successive stages is so uniform and symmetrical, as well as that of their set-offs. He never failed to state his high admiration of the whole design and composition as a specimen of its particular style, and, consequently, his desire to restore the whole in its integrity. With this object, therefore, the drawings already referred to were prepared. The beautiful internal lantern, with its cusp-panelled walls, and its groined ceiling rising to a height of 96 ft. from the floor, he said that he should certainly advise to be exposed again wholly to view. I cannot say what he might eventually have recommended with regard to the bells, but when he restored the adjoining church of the Holy Trinity there was a somewhat similar case, to meet which he erected a detached belfry in the churchyard.

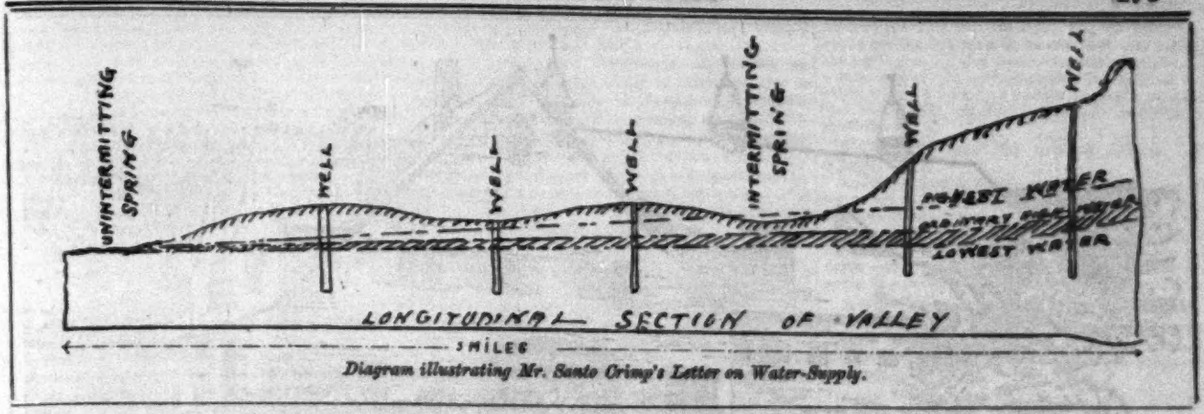


Diagram illustrating Mr. Santo Crimp's Letter on Water-Supply.

At the express wish of Sir Gilbert I made larger drawings (½-in. scale), showing completely the tower and spire by elevation, section, and plans at its various levels. For the purposes of the actual restoration,—at length, fortunately, taken in hand,—Mr. J. O. Scott told me that these drawings, with my supplementary sketches, had proved an invaluable help, inasmuch as nearly the whole of the enriched surfaces, the design of which thirty-seven years ago could be satisfactorily ascertained (though often with no little difficulty), had since that time utterly perished. I wish now to record my belief that these drawings, so made, may be thoroughly relied on for their careful measurements and correct details, ample time having been devoted to the purpose, and the aid of excellent scaffolding, with other appliances, wherever and whenever required, having been freely provided. I may, perhaps, add that a very good view of this tower and spire is given as one of the plates in Wickes's "Towers and Spires," the drawing for which I had, at his request, previously revised. J. DRAYTON WYATT.

WATER SUPPLY: "THE STUDENT'S COLUMN."

SIR,—Having for a considerable period of time during the years 1876-8 been engaged upon a hydro-geological survey of a great part of Surrey, I should be glad to be allowed to offer a few criticisms upon that part of the chapter in your issue for Aug. 24 which refers to intermittent springs,—which are generally known in chalk districts as "bournes," more especially as my observations were particularly directed to a solution of this interesting problem.

I think it could be demonstrated that the reservoir and syphon theory is untenable, but I will merely point to the fact that chalk is an exceedingly porous rock, and as such, a syphon merely cut in it by the action of water could not possibly work.

In order to make the matter as clear as possible in a brief letter, I append a typical section of part of the area examined by me in the years named above.

A series of wells existing in a valley were first found, and the levels of their mouths were reduced to Ordnance datum. Then, the water-line, or line of saturation, was constantly observed, and its position, at intervals of about a month, was plotted upon a diagram. It was found that the position of this line varied with the seasons and with the rainfall. Approximately, its range of vertical movement is shown upon the section, the shaded portion representing the ordinary yearly range; but it happens that, at uncertain intervals, the rainfall differs exceedingly from the average, and when an excess of rain falls during those periods of the year when evaporation is not active, it is more than likely that a "bourne" flow will be observed during the succeeding spring or summer, the water-line being raised to an abnormal height, as shown upon the section, and the springs making their appearance at low portions of the valley. The actual date of the appearance of these "bournes" may be foretold some weeks in advance by carefully observing the water-level in wells in the neighbourhood, and I remember, upon one occasion, I told the owner of a well that the "bourne" would appear in sixteen days from then, which actually came to pass. Mr. Baldwin Latham, for whom I made the observations, and who has devoted an immense amount of time to the subject, can with certainty predict the appearance of these "bournes," or intermittent springs.

W. SANTO CRIMP,
Assoc.-Mem. Inst. C.E., F.G.S.

Wimbledon, Aug. 26, 1889.

*** The explanation we gave is that which has been accepted for many years, and seems to us to satisfy the facts; at the same time, the solution of the difficulty as suggested in the above interesting communication is also perfectly rational. Like many other obscure points, the phenomena accompanying "bournes" are capable of more than one explanation.

"RELATIVE STRENGTH OF AMERICAN WOODS."

SIR,—On page 135 of your issue for Aug. 24 is a paragraph on the "Relative Strength of American Woods." What wood is the "fir of Washington" therein referred to? Is it of the species *pinus* or *abies*, or, in other words, is it a pine or a spruce? What is its exact botanical name? Unfortunately, the nomenclature of timber is so muddled and confused that information intended to be conveyed is lost. To take an example from Baltic timber, the *Pinus sylvestris* of the botanist is vulgarly known as the "Scotch fir." It is a *pine*. In the balk it is known as "fir;" when converted the timber merchant calls it "red deal;" but the carpenter says it is "yellow deal;" whilst by the entirely uninitiated it is variously named "deal," "fir," or "pine," and, sometimes, "Baltic yellow pine," to distinguish it from American yellow pine.

Personally, I have never heard the term "fir" applied to any American wood. W.

*** The confusion as to the nomenclature of timber probably also exists in America; but we may state that the Washington fir referred to is described as "yellow fir." No botanical name is given by our source of information.—ED.

The Student's Column.

WATER-SUPPLY.—X.

QUALITIES OF WATER (*continued*).

WE will now briefly deal with the biological examination of water. It has been hinted, during the discussion of the chemical side of the argument, that zymotic diseases are produced, not by sewage and other animal contamination in water, but by the introduction into the system, and reproduction there, of exceedingly minute lowly organisms found in association with that contamination, some of which are of a deadly character. This is conceded on all sides,—it is common ground. These micro-organisms (bacteria, &c.) reproduce in water at an enormous rate, providing they can find food enough, such as sewage, &c., to support themselves; if the water be absolutely pure, it is impossible for them to flourish in it. From this it is evident that the less the number of bacteria in water, the less organic matter it contains.

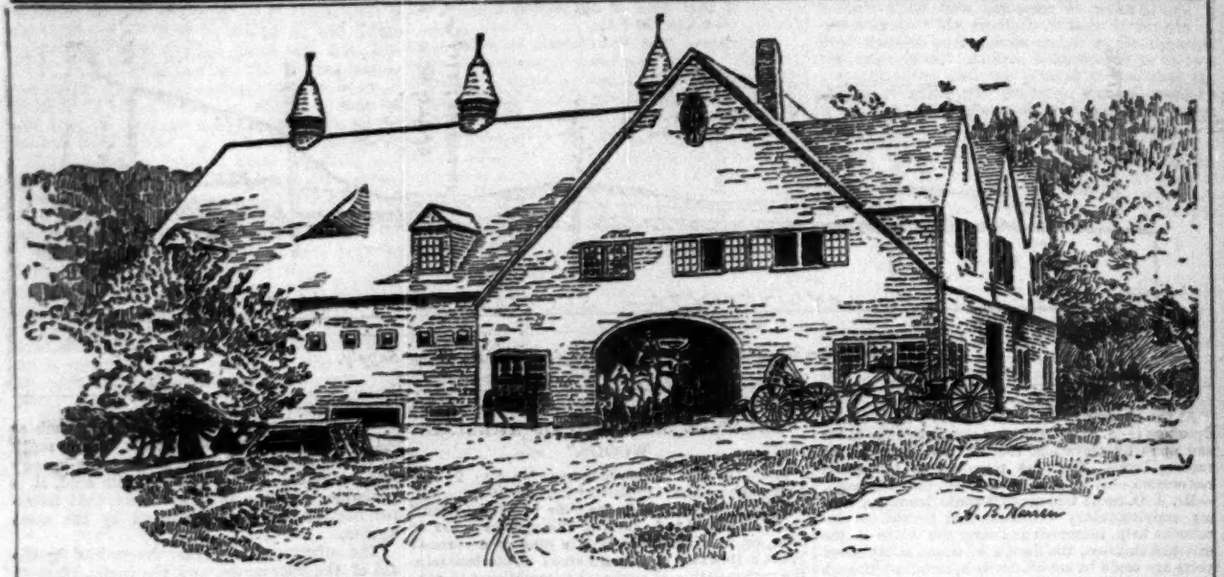
To give some idea of their prolific reproduction, we may mention that Dr. Cohn, of Breslau, has stated that one single bacterium would be sufficient to convert the whole ocean into a solid mass by its progeny in less than five days, supposing only a sufficiency of food. Their tenacity of life is truly astonishing, also. Dr. Frankland, referring to some experiments made upon the subject, says*:—"The bacteria were exceedingly lively under an atmosphere of pure oxygen; that they enjoyed themselves apparently equally well in an atmosphere of carbonic acid; and they were quite lively in nitrogen; that they did not look much depressed in sulphurous acid; that they got a little dull when put under cyanogen, but in a few days recovered even from that, and became nearly as lively as ever; but when they were brought into contact with a solution of carbolic acid of a certain strength, they immediately ceased to move and live. The same effect was also produced by spongy iron; by a short contact with that substance the bacteria became lifeless forms." The bacteria experimented upon were those developed in putrefaction, and were not capable of communicating disease to man; but inasmuch as all the known forms of bacteria behave much in the same way under such agents as spongy iron, sulphurous acid, and carbolic acid, it is probable, says the same authority, that harmful bacteria are also destroyed by the same agents.

* Min. Proc. Inst. C.E., Vol. LXXII. (1883) p. 46.

The minute organisms are determined by the aid of the microscope, and the method largely adopted in examining water by this means is known as Koch's gelatine process. The method employed by some experimenters is shortly as follows:—The original spores of the micro-organisms being invisible, specimens of the water are examined after these have been cultivated in gelatine melted and mixed with the water, and placed in a special chamber where the air is saturated with moisture. After a few days, centres of activity, or "colonies," are developed in it, which can be counted by the aid of a magnifying glass. Mr. A. Wynter Blyth, who has paid much attention to the subject, analysed, month by month, the water of the West Middlesex and Grand Junction Water Companies, and he ascertained that the colonies per drop varied from three in November to seven in May, and as many as forty-five in July. This is much purer than the water supplied to the City of Berlin, in which 140 micro-organisms are found in the drop in October, and thirty in February. He believes that good water should not contain more than forty micro-organisms per drop, when cultivated within twenty-four hours after collection. We shall refer to the value of this conclusion presently.

It will be gathered from what has already been said, that the micro-organisms in water are broadly of two kinds, one of which is of a dangerous nature, the other harmless. But there is considerable difficulty in discriminating the difference between the two. It is claimed that certain species can be recognised which have been proved to have been instrumental in producing, if they have not been the actual cause of, certain forms of disease. The science, however, is in such an elementary state at present, that but exceedingly few of these dangerous organisms can with certainty be identified. Indeed, Dr. G. Bischof, in a communication to the Royal Society last year, concludes that "no bacteriological water-test can satisfy the demands of hygiene unless it is qualitative, distinguishing between harmless and pathogenic microphytes. No such test is at present known." This sufficiently gives the present position of affairs, though we think some reserves might have been made. There can be no doubt that whole colonies of bacteria might exist in water which would still be wholesome, unless it could be shown that they were of the particular kinds capable of producing disease. On the other hand, a single colony of the dangerous kinds, or even a few individuals, would expose the drinker to infection, and if it were always possible to detect this latter with certainty, the quality of drinking water in regard to organic contamination might be foretold almost with mathematical exactitude. Every day brings fresh discoveries on this head, and the time is not far distant when the question will be entirely resolved.

In the meantime, we may point out that the results of the experiments are often liable to be inaccurate, by reason of the peculiar circumstances surrounding the examination of the samples of water submitted. Water is not the only medium containing the micro-organisms; they exist also in large numbers in the air, their germs being so infinitesimal, and so easy of



Stables, Wentworth Hall, Jackson, N.H.—Mr. W. A. Bates, Architect.

translation from place to place, as to find their way almost everywhere. Even whilst the analyst is dealing with the sample, it may, and frequently does, become altered in nature by the addition of showers of these small germs falling into it from the air in his laboratory. Professor Tyndall found that in passing through his laboratory in Albemarle-street, which was infected with germs derived from old hay, to a shed on the roof where he was conducting some experiments on these lowly creatures, that he carried some of these germs with him, and so infected the laboratory above also. If the operator is not extremely careful, therefore, his results may not only indicate the kind of organisms found in the sample of water he is analysing, but also those of the atmosphere in his laboratory, an element entirely foreign to the nature of the enquiry.

From this it is easy to understand that zymotic diseases may be contracted by the public through drinking water which, when delivered to them, was comparatively pure, but has become contaminated by reason of the presence of these deleterious germs in the insalubrious atmosphere of their own homes. The water in their houses may also be rendered exceedingly unwholesome through domestic carelessness. Unquestionably the greatest sinners in this respect are those people, both in high and low stations of life, who, from various causes, keep their cisterns in a filthy condition, and we are of opinion that what few zymotic diseases have within the past few years been suspected to be due to water contamination in the metropolis, have in a great measure been caused by gross, inexcusable negligence on the part of consumers in not attending to the state of their cisterns and water receptacles in general, rather than to the quality of the water as delivered to them by the water companies.

We have now come to the conclusion of the argument, and it may be useful before giving our decision, to sum up both the chemical and biological evidence. We have seen that in the present condition of science it is not possible to state precisely the hygienic meaning of all the parts of a chemical water-analysis; considerable doubt exists as to the interpretation to be placed on almost every part of it connected with the detection of organic pollution, and especially in regard to previous sewage contamination. But it may fairly be conceded that unoxidised organic matter can be quantitatively recognised, and although the subdivision of the organic carbon into animal and vegetable cannot with certainty be effected, and the result is thereby prejudiced in a certain degree, yet we must remember that practically the whole is a pollution, and in many cases there are strong reasons for believing that it is due to sewage contamination. Professor Wanklyn's remark on albuminoid ammonia also must not be disregarded; whilst the chlorine often affords collateral evidence of bad quality.

The bacteriological side of the argument, in the present condition of micro-biological science, does not point to anything very definite. It certainly proves the existence of micro-organisms in water, but it is not capable of distinguishing those which are deleterious to health, and those which are not, except (it is claimed) in a few instances. When the connexion of specific organisms shall be definitely traced to certain diseases, and the microscope can indicate these organisms with absolute certainty in water, then, we repeat, the bacteriological test will be able to gauge the quality of drinking water to a nicety; and, seeing the rapid strides made in that direction almost every day, we may confidently assert that in the immediate future chemical analysis in regard to organic contamination will most assuredly be supplanted by biological examination. A new condition of things must obtain.

Our advice to the student, then, is still to adhere to the chemical analysis in so far as it deals with mineral and present organic contamination. It is not always quite so clear in its meaning as could be desired, but, rightly understood, it is at present the best available guide to the quality of drinking-water.

STABLES, WENTWORTH HALL, JACKSON, N.H.

THESE stables are an example of modern American stable architecture in connexion with a large private residence. The exterior is entirely finished with shingles stained. The architect is Mr. W. A. Bates, of New York.

Books.

Electric Bells, and all about them. A Practical Book for Practical Men. By S. R. BOTTONE. (London: Whittaker & Co. 1889.)

THE "Preliminary Considerations" with which this little book opens, will puzzle those who are endeavouring, for the first time, to understand the mysteries of electrical science, while they cannot fail to amuse others who have already mastered the elements of the subject from some reliable text-book, written by a man who understands what he is talking about. We learn, for instance, that "electricity appears to depend, in its manifestations, upon some motion (whether rotary, oscillatory, or undulatory, it is not known) of the atoms themselves;" after this remarkable introduction there is given an account of the inevitable experiments with a piece of ebonite and suspended pith-balls, of which the precise relationship to electric bells is not made clear. The action of a simple cell follows, the old confusion between negative elements and positive poles being maintained; in connexion with the explanations afforded there appears the following note:—"From some recent investigations, it would appear that what we usually term the negative is really the point at which the undulation takes its rise," a statement that will at least offer the young beginner food for thought. On page 14 is shown what purposes to be the magnetic field mapped out by iron filings around a horse-shoe and a bar magnet; if any of Mr. Bottone's readers try the experiment for a bar magnet, they will be rather surprised on comparing the result so obtained with the illustration given.

The next chapter, "On the Choice of Batteries for Electric Bell Work," is marred, at the commencement, by further scientific attempts on the part of the author. What excuse can be made for such a statement as this, "Nitric acid consisting of 1 nitrogen atom, 6 oxygen atoms, and 1 hydrogen atom"? This is no printer's error, for at once follows the formula, HNO_3; surely the writer might take the precaution of consulting some one of the many little text-books on chemistry now published, before stating wrongly the composition of one of the commonest acids of commerce. At this point, any further struggles with elementary science are fortunately abandoned, and the instructions for the construction and management of cells, suitable for electric bell work, are thoroughly practical and well expressed.

The sections "On Electric Bells and other Signalling Appliances" are conceived and written in the author's happiest vein. He very truly states, "In order that the electric bell-fitter may have an intelligent conception of his work, he should *make* a small electric-bell himself." The next forty-eight pages are devoted to very clear explanations, the value of which is greatly enhanced by a sufficient number of well-drawn figures, "*How to Make a Bell.*" The trembling, single-stroke, and continuous bell are all dealt with, and a choice of constructions given, attention being also called to less common forms, which possess certain novel features, for which special advantages are claimed. The next chapter is "On Contacts, Pushes, Switches, Keys, Alarms, and Relays." Owing to the greater number of devices dealt with, the details are necessarily given less fully than in the preceding chapter, but, with the aid of the cuts, no difficulty should arise in understanding either the action or construction of the apparatus described.

The final pages are "On Wiring, Connecting-up, and Localising Faults." In view of the fact that nearly all the failures, which bring electric bells into disrepute, are due exclusively to inferior wire, which developes faults, perhaps in a few months, in places frequently next to impossible to get at, we wish the author had written more strongly on this point than he has done, and had stated specifically what wire, in his experience, stands the test of time. The competition in the electric bell trade is so keen that even the best firms often use wire of very inferior quality, unless otherwise instructed; and if the author, in a future edition, would definitely specify the insulation to be used, or name some of the standard wires made by reliable firms, he might save many of his readers

from ultimate failure and disappointment. A number of diagrams are given, showing how connections are to be made for using electric bells in all sorts of ways, and in every case full explanations and valuable hints are given.

The closing sections, on localising faults, are eminently practical, though, of course, no methods are given beyond such as can be carried out with a few Leclanché cells and a detector. The author very justly observes:—"When the fitter is called to localise defects which may have occurred in an installation which has been put up some time, before proceeding to work let him ask questions as to what kind of defect there is, and when and where it evinces itself." If this advice is intelligently acted upon, an immense amount of useless testing will be avoided.

So far as the practical instructions and explanations contained in Mr. Bottone's book are concerned, an amateur or workman engaged in electric-bell fitting cannot fail to derive great benefit from their perusal; but the scientific matter is antiquated as to its nomenclature, and if not positively wrong, is, to say the least, misleading. For these reasons a little discretion must be used by the reader when the author is engaged in other than purely practical considerations.

A Manual of Rules, Tables, and Data for Mechanical Engineers. By D. K. CLARK, M.Inst.C.E. Fourth edition. 1889. Blackie & Son.

THIS volume furnishes a very valuable compilation of practical rules and tables collected by the author, and possesses the advantage of being based upon the most recent investigations. It furnishes an epitome of the chief fundamental principles of mechanism connected with elementary constructions, and provides useful information upon the strength of materials, labour, combustion, and fuels, heat and its applications, steam and its properties, steam-boilers, steam-engines, gas-engines, hot-air engines, air-machines, hydraulic machines, the flow of air and water, mill-gearing, friction and the resistance of machinery, &c. The subject of valve-gear is, however, only incidentally mentioned in the text, and neither the object nor use of valves is specially described.

The author quotes references, and we are glad to note that he appears to have been careful of his authorities. His references suggest reliable authorities to consult for further information. The book, which consists of 984 pages, contains 353 diagrams and 320 tabular statements, all numbered consecutively independently of the page, so as to be both easily and definitely referred to. The type is clear, and the last fourteen pages provide a comprehensive index. The work is designed to be a book of general reference for competent practitioners, and is not intended as a text-book for a beginner to learn from. None are gifted with a memory sufficiently retentive to be able to write down all the formulæ which an engineer has to apply in calculation, and the next best thing to being able to do so is to know where to find the information when needed, also to understand it when so found. To those who can comply with the latter condition, Mr. Clark's book will serve to refresh the memory as and when required. The mathematical tables which are added to the volume contribute to its completeness, and render it a useful manual for reference in the office of the engineer.

The Eiffel Tower: a description of the monument, its construction, its machinery, its object and its utility. By GASTON TISSANDIER, Editor of *La Nature*. London: Sampson Low & Co., 1889.

THE preface to this small book contains the usual exaggerated flattery which M. Eiffel's countrymen (the book is a translation from the French) seem to delight to lavish on him; but the reader is not obliged to accept this, and the practical information given as to the preparation of the foundations for the tower is of interest, and well illustrated, for a popular book, as well as other portions of the mechanism of the work, and of the lifts employed. The remarks as to the uses of the tower, at the end of the book, are mostly absurd, and have been invented after the completion of it, to give some colour of justification to what is only an enormous piece of "brag." M. Tissandier thinks "the eagerness of the crowd to visit the great monument is a sufficient reply to all the criticism that has been levelled against it." That a great many fools go up it is quite true; there is always plenty of that kind of appreciation to be had for any new kind of folly.

We observe that Frenchmen, in writing up the Eiffel Tower, now think it necessary also to depreciate the Forth Bridge and its engineers, even to the extent of circulating positive falsehood. M. Tissandier circulates the following quotation from the *Génie Civil*:—

"It is in the setting up," says M. de Nansouty, "that the real difference of method is seen. For the Forth Bridge, the works are furnished with the plans of the fitting and with the parts referred to on the tracings; and some margin for discretion is left in their adjustment and completion. An opportunity is thus given for a certain amount of initiative, and there is need for the employment of a varied and complicated stock of tools requiring mechanical power. In the works on the Eiffel Tower there are, on the contrary, no such complications. There is not a boring or a shaping machine on the spot. The pieces reach the Tower complete in every way. Each piece is numbered, and fits on to the preceding piece with mathematical precision."

That is precisely what is done at the Forth Bridge. Every piece is completely fitted and rivetted in the shops, and the pieces numbered and marked, and then taken down and sent on to be set up on the work. We do not believe the French engineer who has circulated this mendacious statement has ever been at the Forth Bridge works at all. It is little creditable to the common-sense and judgment of French engineers to have lost their heads in this way about the Eiffel Tower; and it says little for French scientific journalism that the editor of a paper of the pretensions of *La Nature* should publish such nonsense. We can hardly imagine our corresponding English periodical, *Nature*, lending itself to this kind of thing.

Old Houses in Wolverhampton and the neighbourhood: consisting of twenty original etchings on stone, with short description of each. By J. R. VEALL, Architect. Published for the Authority: J. Steen & Co., Wolverhampton.

WE cannot much commend the drawings in this book, which are pen-drawings lithographed, of a rather coarse style of execution; and the author makes a mistake (though not an uncommon one) on his title-page, in describing them as "etchings on stone." Etching is a system of drawing on copper, with a needle, and the term is quite wrongly applied to pen-drawing. The illustrations are, however, sufficient to record the features of the buildings, many of which are of considerable interest, more especially if it be the case, as the author tells us, that amid the changes that are being made in Wolverhampton many of these buildings are likely to be removed before long; and Mr. Veall deserves the thanks of those who are interested in old town structures for preserving a record of these. He says he has plenty of material for another similar volume, and we hope he may receive encouragement to produce it; but if so, he should aim at a more refined style of drawing.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

12,540, Skylights, Ventilators, &c. J. Mason.

According to this invention, half the hinged weathering-plates are cast with the solid portion of the frame, and the other half with a suitable projection, or bead, cast with the swinging portion. In addition to these, weathering-plates with projections are used. These are plain, or have a bead in which tongues of V section are fitted. For hinged side-lights for vessels the invention is peculiarly applicable.

12,541, Apparatus for W.C. J. B. Cook.

In the apparatus which is the subject of this patent the ordinary governing valve is used, but on the top of the valve casing is fitted another corresponding casing wherein an ordinary recessed or bucket valve is fixed. A passage governed by a regulating tap passes up the walls of this casing, and one end of the passage communicates with the water-supply pipe, the other opening into the casing above the bucket valve. When the valve is closed it is in its normal position, but when the lever of the supply-valve is released the water gradually fills the bucket, and is forced to flush the closet. The valve and the actuating mechanism are both claimed as new.

14,665, Flushing W.C.'s. W. W. Cottam.

This invention consists in the utilisation of the ordinary earthenware pipes as a means of reserving waste or other water for the flushing of closets without the aid of tanks or cisterns. The invention further provides a watertight flap or valve, the upper portion left open for an overflow. By raising the top it cuts off the water completely, and forms a dam or reservoir, and by raising the body of the valve, which is done by a handle or chain, or some such mechanism, an effective flush for the closet is provided.

5,054, Apparatus for Testing Drains. T. Kemp.

According to this invention, an iron tube turned up at end so as to pass under the seal of the trap, contains within it a small glass tube, in which is a chemical having a strong odour. This glass tube is broken, and the contents flushed or forced into the drain. The smell can only escape from defective parts, and thus faults are found and localised.

8,482, Flushing Tanks. J. and A. Duckett.

It is claimed that by a peculiar arrangement of syphon-tubes as part of a trap, solids are arrested, and the drain and tank periodically and automatically flushed.

9,628, Lavatory Apparatus, &c. J. W. Holland.

According to this invention a tube or rim has holes at intervals for flushing the basin around which it is fixed. Water is conducted to this rim, and finding an outlet through the said holes, striking with sufficient force against the inside of the basin to cleanse it.

NEW APPLICATIONS FOR PATENTS.

Aug. 19.—13,036, A. Taylor, Building up the Inside of Kilns for Burning Enamelled Bricks and Tiles.—13,046, W. Bramwell, Chimney-tops.—13,050, T. Hyatt, Pavements and Paving Materials.—13,051, J. Pierce and F. Luther, Enamelled Metallic Tesselated Plates for Floors, &c.

Aug. 20.—13,098, W. Edwards, Fastening or Fixing Ironwork to Stonework or Woodwork.—13,105, De Pennsfather and M. Walker, Chimney, Ventilating, and other Cowls, Heads, or Windguards.—13,118, A. Clark, Moulding Planes.

Aug. 21.—13,153, F. Barnett, Ventilating and Purifying Sewers, Drains, and the Interior of Buildings Automatically.—13,160, W. Cruwys, Preventing Down Draught to Chimneys and Ventilating Shafts.—13,203, J. MacMahon, Composition for Preventing Decay in Wood.

Aug. 22.—13,228, J. Oates, Painters' Brushes, &c.—13,267, J. Hamilton, Circular-Saw Machines.—13,280, J. Arnold, Disinfecting and Deodorising Sewer Gases, &c., in Soil-pipes, Drains, &c.

Aug. 23.—13,289, A. Tremgrove, Window-sashes and Frames.—13,329, C. White, Water-proof and Fire-proof Material for Roofing, &c.

Aug. 24.—13,380, G. Zachmann, Door-lock.—13,385, H. Perry, Cornices for Rooms.

PROVISIONAL SPECIFICATIONS ACCEPTED.

8,188, L. Follansbee, Traps for Baths, Water-closets, &c.—10,212, W. Read, Painters' and Plumbers' Blow-lamp.—10,655, E. Adams, Securing Windows and Ventilation.—10,754, J. Dean, Flushing Closets with Water Waste from Sinks.—10,914, H. de Lespare and W. Shafts, Manufacture of Concrete.—11,144, H. Johnson and T. Wilson, Air Supply Ventilators.—11,145, H. Johnson and T. Wilson, Air Inlet Ventilator for Sash Windows.—11,146, H. Johnson and T. Wilson, Exhaust Ventilators for Chimney Flues.—11,252, H. Trimby, Self Countersinking Screw for Wood.—11,285, R. Gibbs, Bricks and Blocks.—11,337, J. Pullen, Opening and Closing Casements and Fan-lights.—11,403, N. Procter and Others, Brick-making Machines.—11,948, J. Lovell, Hanging Window-sashes.—12,257, A. Illidge, Sash-fasteners.—12,450, J. Mulligan and C. Swindell, Chimney or Ventilating-caps.—12,578, S. Coales, Door-locks and Latches.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

14,236, J. Ransome, Artificial Stone and Concrete Blocks.—14,327, A. Hutchison, Construction of Baths.—14,663, J. Rogers, Syphon Cistern for Waste-water Preventers.—14,853, G. Pankhurst, Brick, Tile, or Slab for Building.—14,890, J. Colton and J. Lambert, Glass Mosaic-work.—15,162, J. Dunham, Brick-machines.—15,168, A. Bradley, Fret Saws.—15,176, L. Teale, Fire-places.—15,176, A. Retsinos, Apparatus in Combination with Water-waste Preventers.—15,202, J. Shona, Sewer or Drain Flushing Tanks.—15,203, J. Shona, Ventilation of Drains and Sewers.—15,236, J. Dewrance and B. Church, Cementing Asbestos.—16,214, J. Phelps, Eaves, Gutters of Roofs.—7,899, H. Fries, Sanitary Dust-bins.—8,186, L. Follansbee, Traps for Baths, Water-closets, &c.—8,747, J. Beresford, Water-closets.—9,299, A. Einsenhorf and others, Water-closets.—10,978, W. Bartholomew, Baths.—11,444, M. Adams, Roofing Tiles, &c.—11,570, A. Boult, Closing Devices for Keyholes and Locks.

Margate Main Drainage.—We are informed that the tender of Messrs. B. Cooke & Co., of Battersea, has been accepted for the execution of these works, of which Mr. Baldwin Latham, C.E., is the engineer. The contract amount is about 60,000*l*.

RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

Aug. 13.—By W. E. Hallett (At Chelmsford).

Chelmsford — Lower Archer-st., "Brickfield-cottage," f. £230
10 to 17, Lower Archer-st., f., r. £72. 10s. p.a. 620
7, 8, 9, 9a, 9b, and 9c, Lower Archer-st., f., r. £63. 6s. p.a. 960

Aug. 27.—By J. J. Devereux & Co.

Haverstock-hill—113, Mansfield-rd., u.t. 63 yrs., g.r. £6. 15s., e.r. £45 330

By Messrs. Cobb.

Port Victoria, Kent — Three cottages and 1a. 2r. 0p., f. 550
Friadsbury—"Geddington House," and 2a. 1r. 10p., f. 3,200

Aug. 28.—By Jones & Son.

West Ham—63, Upton-row, f., r. £18, &c. p.a. 185
Lamehouse—35, Hopemaker's-fields, f., r. £22. 2s. p.a. 170

By Vaughan & Co.

Regent's-park—25, Oval-rd., u.t. 55 yrs., g.r. £20, r. £45 200
Hampstead-rd.—19, Edward-st., u.t. 33 yrs., g.r. £11, r. £70 600

Aug. 29.—By Moss & Jameson.

Clerkenwell—21 and 22, St. John's-sq., f., r. £170 p.a. 3,400

By R. Stimson.

Peckham—115, Asylum-rd., u.t. 57 yrs., g.r. £9. 8s. 9d., e.r. £35 175
1, Shields-st., u.t. 64 yrs., g.r. £6, r. £45 p.a. ... 325
Brixton-rd.—No. 372, u.t. 49 yrs., g.r. £13, 10s., e.r. £100 p.a. 730
Chelsea—6, Lamont-rd., u.t. 55 yrs., g.r. £7, e.r. £43 p.a. 300

By F. W. Glasier.

Tottenham Court-rd.—The lease of 114, Whitfield-st., u.t. 20 yrs., r. £91. 2s. p.a. 135

By Weeks & Read.

Upper Clapton—36, Beechholme-rd., u.t. 60 yrs., g.r. £6. 9s. 220

Aug. 30.—By Protheroe & Morris.

Victoria Park—107, Bishop's-rd., u.t. 54 yrs., g.r. £5 330
Stratford—51 to 58, Henniker-rd., u.t. 76 yrs., g.r. £4. 2s. 6d. 1,400

[*Contractions used in this list.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; yd. for yard, &c.]

Miscellanea.

The Purification of the Mersey: Action of the Stockport Corporation.—The *Manchester Guardian* says that the Corporation of Stockport, at a special meeting on the 29th ult., authorised the purchase of ninety-five acres of land in the township of Cheadle as a site for works of sewage purification; and Mr. A. M. Fowler, C.E., of Manchester, received instructions to schedule the land and prepare the necessary plans with a view to an early application to the Local Government Board for a provisional order. The land is described as highly suitable for the purpose, and conveniently situated on the banks of the Mersey, a short distance from Stockport. In the event of the scheme for an extension of the borough being carried out it will be comprised within the future municipal boundary. This action of the Stockport Corporation is important, and must influence that of other municipal authorities on the Mersey watershed. It is a practical response to the appeal of the Ship Canal directors. Stockport has from the first shown a great interest in the Canal, and its Corporation seems determined to do what is practicable within its own limits to purify the streams which will become feeders to the great waterway. The Council passed a further resolution directing that notice should be sent to all the municipal and local authorities above Stockport informing them of what is being done, and requiring them likewise to take steps for dealing with their sewage before it is passed into the streams. This notification will affect Ashton, Stalybridge, and other towns and populous villages on the banks of the rivers Mersey and Tame.

Guernsey.—Messrs. Pepper & Boyes, of London, have just placed in St. Matthew's Church, Guernsey, a memorial window to the late Lieutenant Governor, Lieut.-General Elkington. It is a one-light window, with a figure of St. Michael.

The Technical Education of Plumbers.—Mr. W. R. E. Coles, the Clerk of the Worshipful Company of Plumbers, sends us a copy of a circular communication (the terms of which have been approved by the Right Hon. C. T. Ritchie, the President of the Local Government Board), which is being forwarded, in accordance with Mr. Ritchie's suggestion, to the Clerks of the Boards of Guardians and Sanitary Authorities of the kingdom. The circular accompanies a report of the proceedings of the highly influential and representative deputation which recently waited upon him to ask his official aid in promoting the great public movement which has been in active progress during the past five years, for advancing technical education among plumbers, and securing the National Registration of the qualified plumbers of the United Kingdom. The circular (which is signed by Mr. W. H. Bishop, the Master of the Plumbers' Company) says:—"It is unnecessary to occupy your time by referring in detail to the serious evils hitherto and now suffered by the public through defective and unsanitary plumbers' work, or in remarking upon the anomalous circumstance that while it has long been the practice to require that medical practitioners, druggists, and others dealing with matters affecting the health of the community should possess sufficient training and prove their qualification before undertaking their duties, there is not at present any corresponding safeguard to the public in respect of plumbers, upon whose efficiency the health of the public is even more largely dependent. It will suffice for the practical object of this communication to direct your attention to the fact that the whole subject has been very fully considered; and, with the approval and assistance of a large body of Municipal and Sanitary Authorities, Medical Officers of Health, architects, educationists, and publicly-elected representatives of each section of the plumbers' trade, a system has been carefully organised by which the educational status of plumbers may be elevated, and the registration of qualified men provided for throughout the United Kingdom." The circular then goes on to invite the co-operation of the public bodies to whom it is addressed. We are informed that from the response already received, the effort now put forth is likely to materially promote the object in view.

New Town-hall at Helsingborg, Sweden.—The jury appointed to consider the designs for a new Town-hall at Helsingborg, Sweden,—for which there was a large number of competitors,—has awarded three premiums and purchased two other meritorious designs. The first prize has been awarded to Herr Alfred Hellerström, whose design shows a richly-ornamented Gothic palace of sandstone and brick, with large round towers at the four corners, and a lofty square central clock-tower over the main entrance. Most of the other architects had chosen the Renaissance style. The exhibition of all the drawings in Stockholm has attracted great attention, critics maintaining that it furnished a fine and highly-creditable proof of the ability and power of the rising generation of Swedish architects.

The North Sea-Baltic Canal.—The work upon the North Sea-Baltic Canal is being actively proceeded with, the men at work upon it numbering some 3,500, nearly all of whom live in barracks. There are twelve of the latter buildings along a distance of 100 kilomètres, and three hospital barracks. Work is now carried on along the whole length of the canal, nearly 70,000,000 cubic feet of earth having been excavated, at a cost of 2,800,000*l*. The great dock-works at each end of the canal,—viz., at Brunsbüttelhafen and Holtenau,—have been entrusted to contractors. The entire canal is to be fully completed by the end of 1894, but a considerable section long before. A large number of the workmen are Italians and Austrians.

The English Iron Trade.—The English iron market continues very steady and very strong. In some departments of trade business is as brisk as ever, whilst in others it is rather of a halting nature, but it is fully expected that the demand will soon be very heavy again in all branches. While stocks of pig-iron are being slowly but steadily reduced the demand keeps fairly active. There has been another large rise in Scotch makers' iron, as much as 3s. a ton more being quoted for the Coltness brand, and from 6d. to 1s. 9d. per ton for other descriptions. Finished iron and steel are largely dealt in, chiefly for shipbuilding purposes; the shipbuilding trade continuing very prosperous. Engineers are briskly employed.—*Iron.*

PRICES CURRENT OF MATERIALS.

TIMBER.		£.	s.	d.	£.	s.	d.
Greenheart, B.G.	ton	7	0	0	7	15	0
Teak, E.I.	load	13	0	0	14	0	0
Sequoia, U.S.	foot cube	0	0	3	0	0	3
Ash, Canada	load	3	10	0	5	0	0
Birch ,,		3	10	0	5	0	0
Elm ,,		4	0	0	5	0	0
Fir, Dantzic, &c.		2	0	0	2	10	0
Oak ,,		2	10	0	4	10	0
Canada ,,		5	10	0	7	10	0
Pine, Canada red		3	0	0	4	0	0
,, yellow		3	10	0	5	5	0
Lath, Dantzic	fathom	4	10	0	5	10	0
St. Petersburg		5	0	0	6	10	0
Wainscot, Riga, &c.	log	2	15	0	4	5	0
Deals, Finland, 2nd and 1st	std.	9	0	0	11	0	0
,, ,, 4th and 3rd		7	0	0	8	15	0
Riga ,,		7	0	0	9	0	0
St. Petersburg, 1st yellow		11	0	0	15	0	0
,, 2nd ,,		10	0	0	11	0	0
,, white		7	0	0	10	0	0
Swedish		8	0	0	16	0	0
White Sea		9	0	0	17	0	0
Canada, Pine, 1st		16	0	0	26	0	0
,, ,, 2nd		11	0	0	17	10	0
,, ,, 3rd, &c.		6	0	0	10	10	0
,, Spruce, 1st		9	0	0	11	0	0
,, ,, 3rd and 2nd		7	0	0	9	0	0
New Brunswick, &c.		6	10	0	8	10	0
Battens, all kinds		6	0	0	15	0	0
Flooring Boards, sq., 1 in., prepared, First		0	11	0	0	14	0
Second		0	8	0	0	10	0
Other qualities		0	5	0	0	7	0
Cedar, Cuba	foot	0	0	4½	0	0	5
Honduras, &c.		0	0	4½	0	0	4½
Mahogany, Cuba		0	0	4½	0	0	5½
St. Domingo, cargo average		0	0	4½	0	0	5½
Mexican ,,		0	0	4½	0	0	5½
Tobasco ,,		0	0	5½	0	0	6½
Honduras ,,		0	0	5½	0	0	6½
Box, Turkey	ton	4	0	0	13	0	0
Rose, Rio		15	0	0	20	0	0
Balsa		14	0	0	16	0	0
Satin, St. Domingo	foot	0	0	0	0	1	0
Porto Rico		0	0	0	0	1	3
Walnut, Italian		0	0	4½	0	0	6½
METALS.							
Iron—							
Pig, in Scotland	ton	4	15	0	0	0	0
Bar, Welsh, in London		6	5	0	6	10	0
,, at works in Wales		4	15	0	5	0	0
,, Staffordshire, in London		5	10	0	6	10	0
Copper—							
British, cake and ingot	ton	47	10	0	0	0	0
Best selected		48	10	0	0	0	0
Sheets, strong		56	0	0	0	0	0
Chili, bars		43	15	0	0	0	0
Yellow Metal	lb.	0	0	5	0	0	5½
Lead—							
Pig, Spanish	ton	12	13	6	12	13	9
English, com. brands		13	17	6	0	0	0
Tin—							
Straits	ton	91	15	0	0	0	0
Australian		91	15	0	0	0	0
English Ingots		95	0	0	0	0	0
Zinc—English sheet	ton	21	0	0	22	0	0
OILS.							
Linseed	ton	21	15	0	22	0	0
Cocoanut, Cochin		27	10	0	29	0	0
Ceylon		24	0	0	24	5	0
Palm, Lagos		26	0	0	0	0	0
Rapeseed, English pale		32	0	0	0	0	0
,, brown		30	5	0	0	0	0
Cottonseed, refined		27	0	0	28	5	0
Tallow and Oleine		21	0	0	40	0	0
Lubricating, U.S.		5	0	0	6	0	0
,, refined		7	0	0	13	0	0
Tar—Stockholm	barrel	1	4	3	1	4	6
Archangel		0	15	9	0	16	0

TENDERS.

[Communications for insertion under this heading must reach us *not later than* 12 *Noon on Thursdays.*]

BANSTEAD (Surrey).—For a new billiard-room to "Castleton," (Banstead, Surrey, for Mr. John Jaques. Mr. W. H. Woodroffe, architect, 214, Great Dover-street, London, S.E.:—

W. Downs	£630 0 0
G. Parker	630 0 0
W. Taylor	624 10 0
Young & Lonsdale	602 0 0
E. W. Sanders	587 0 0

BEDFORD.—For 2,000 tons broken granite delivered at Bedford Station, for the Authorities:—

J. Scott & Co., Ingleton	£0 15 0	per ton !
J. E. Page, Mountsorrel	0 9 9	,,
Ellis & Everard, Bardon Hill	0 9 6	,,
Charnwood Granite Co.	0 9 6	,,
H. J. Skelton & Co.	0 9 6	,,
Enderby and Stoney Stanton Co.	0 8 10	,,
Ferguson & Starkey, Enderby	0 8 10	,, !

! Accepted.

BELTON.—For a small farm-house, Belton, Suffolk, for Sir Savile B. Crossley, Bart., M.P. Messrs. Bettle & Olley, architects, Great Yarmouth:—

Jas. Leggett, Yarmouth	£503 0 0
Cork & Beech, Yarmouth	496 0 0
Arthur Bedwal, Lowestoft	475 0 0

BROMLEY (Kent).—For building a new billiard-room, and making sundry alterations to the main building at the "Beech Tree," Bromley, Kent, for Mr. Chas. Wall. Mr. Horace T. Bonner, architect, King-street, Cheapside. Quantities supplied by Mr. H. Dow White, 16, New Broad-street:—

Holloway, Deptford	£1,291 0 0
Shewbrooks, Bromley	1,117 13 0
Payne, Bromley	1,070 0 0
Jerrard, Lewisham (accepted)	1,043 0 0
Robson, Lewisham	927 0 0

Fencer's Work.

Brown, Camberwell (accepted)	£119 0 0

COMPETITION, CONTRACTS, & PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

COMPETITION.

Nature of Work.	By whom Required.	Premium.	Designs to be delivered.	Page.
Municipal Buildings	Sheffield Corporation	600*l.*	Dec. 2nd	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Granite Kerb	East Ham Local Board	W. H. Savage	Sept. 10th	xiv.
Broken Granite	do.	do.	do.	xiv.
Paving Footpaths	do.	do.	do.	xiv.
Levelling and Making-up Streets	do.	do.	do.	xiv.
Granite	Staines Local Board	*Official*	Sept. 11th	xv.
Roadmaking and Paving Works	Hammersmith Vestry	H. Mair	do.	ii.
General Sewer Works	Lambeth Vestry	Hugh McIntosh	Sept. 12th	xiv.
Sewer Extension	Bromley Local Board	*Official*	Sept. 17th	xiv.
Roadmaking and Paving Works	Leyton Local Board	W. Dawson	do.	xiv.
Cast-iron Water Mains	Tottenham Local Board	J. E. Worth	do.	xiv.
Roadmaking and Paving Works	Greenwich Bd. of Wks.	*Official*	Sept. 18th	xiv.
Erection of Schools	Beckenham School Bd.	Jno. Ladds	Sept. 19th	xiv.
New Vestry Hall and Offices	St. Martin-in-the-Fields Vestry	R. Walker	do.	xiv.
Construction of New Road, Croydon	Croydon Land, &c., Co.	Blake, Haddoch, & Co.	Sept. 21st	xiv.
Erection of Board School	Tilehurst School Board	F. W. Albury	do.	ii.
New Works, Bristol Lunatic Asylum	Bristol, City of	H. Crisp & Catley	Sept. 24th	xiv.
Street Works	Sheffield Highway Com.	C. F. Wike	Sept. 25th	xv.
Alterations, County Police Station, Chelmsford	Essex C. C., &c.	*Official*	Sept. 27th	xiv.
New Coastguard Station, Deal	Admiralty	do.	do.	ii.
Brick and Stoneware Pipe Sewers	Aylesbury Local Board	G. Cannon	Sept. 28th	xiv.
Superstructure of Lunatic Asylum	London County Council	G. T. Hine	do.	xiv.
Enlargement of Lunatic Asylum, Coulsdon	do.	C. H. Howell	Sept. 30th	xiv.
New Post-office, Barrow-in-Furness	Com. of H.M. Works	*Official*	do.	ii.
Sewerage and Sewage Disposal Works	Bingley Local Board	A. E. Preston	do.	xiv.
Storage Reservoir, &c.	Yeadon Water Co.	do.	do.	xiv.
Construction of Portion of Aqueduct	Manchester Corporation	G. H. Hill	Oct. 3rd	ii.
Municipal Buildings	Gloucester Corporation	*Official*	Not stated	xiv.
Block of Stables, Wagon Sheds, &c., Chatham	War Department	do.	do.	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Clerk of Works	Chesham Local Board	2*l.*	Sept. 11th	xviii.
Sewerage Inspector	Blackburn Corporation	104*l.*	Sept. 14th	xviii.
District Surveyors (3)	Lancashire C. C.	200*l.* each	Sept. 17th	xviii.

BROMLEY (Kent).—For 1,300 feet lineal of 9-inch stoneware pipe sewer in Bird-in-Hand-lane, &c., for the Bromley Local Board. Mr. Hugh S. Cregeen, Surveyor:—

A. T. Catley	£300 0 0
T. Adams	295 0 0
G. Bell	281 0 0
Woods & Co.	279 0 0
H. Drury	270 13 9
T. Lansbury	214 0 0
A. Palmer	205 0 0
E. Peill & Sons (accepted)	190 0 0

BROMLEY (Kent).—For making up the several roads hereafter named, for the Bromley Local Board. Mr. Hugh S. Cregeen, Surveyor:—

Blyth-road.

Woods & Co.	£1,360 12 2
John Mowlem & Co.	1,106 0 0
T. Adams	1,098 3 11
G. Bell	1,096 0 0
A. T. Catley	968 0 0
E. Peill & Sons	940 0 0
T. Lansbury	937 7 10
A. Palmer (accepted)	901 0 3

Highland-road (portion of).

Woods & Co.	£520 0 0
G. Bell	446 0 0
T. Adams	427 10 5
J. Mowlem & Co.	419 0 0
A. T. Catley	390 0 0
T. Lansbury	372 17 10
A. Palmer	365 19 4
E. Peill & Sons (accepted)	363 0 0

Weston-road.

H. Drury	£453 14 0
Woods & Co.	439 5 3
A. T. Catley	433 0 0
G. Bell	406 0 0
T. Adams	397 0 0
J. Mowlem & Co.	393 0 0
T. Lansbury	388 10 8
E. Peill & Sons	330 0 0
A. Palmer (accepted)	326 19 9

Weston-grove.

Woods & Co.	£317 2 10
H. Drury	307 13 10
G. Bell	291 0 0
T. Adams	290 9 10
J. Mowlem & Co.	285 0 0
A. T. Catley	276 0 0
E. Peill & Sons	250 0 0
T. Lansbury	247 13 2
A. Palmer (accepted)	232 3 4

Moreland-road.

Woods & Co.	447 15 6
A. T. Catley	444 0 0
T. Adams	431 17 4
H. Drury	421 1 11
G. Bell	415 0 0
J. Mowlem & Co.	402 0 0
T. Lansbury	345 14 0
E. Peill & Sons	343 0 0
A. Palmer (accepted)	324 16 10

BROMLEY (Kent).—For the construction of a new road, 330 ft. in length, in the College Field, for the Bromley Local Board. Mr. Hugh S. Cregeen, Surveyor:—

G. Bell	£361 0 0
Woods & Co.	362 19 10
A. T. Catley	360 0 0
T. Adams	336 5 8
J. Mowlem & Co.	320 0 0
E. Bell & Sons	295 0 0
A. Palmer	277 10 7
T. Lansbury (accepted)	276 17 2

CATFORD, S.E.—For alterations and additions to the St. Lawrence's Mission-room, Brockdale-road, Catford:—

Jerrard, Lewisham	£180 0 0
Laird, Catford	161 0 0
Robson, Lewisham	147 10 0

CHARLTON (Kent).—For a pair of houses at Dean's-common, Charlton, for Mr. George Chapman. Mr. Thomas Dinwiddy, F.S.I., architect:—

Kennard Bros.	£900 0 0
Martin	849 0 0
T. D. Long (accepted)	845 0 0

CROYDON.—For the erection of small house, Drummond-road, Croydon. Mr. Henry Gough, architect, Station-road, West Croydon:—

Smith & Bulled	£385 0 0
Page	373 0 0
Bennett	348 10 0
Saunders*	330 0 0

* Accepted as amended, £300.

FARNBOROUGH.—For alterations and additions to schools at Farnborough, Kent, for the Farnborough School Board. Mr. St. Pierre Harris, architect and surveyor, 1, Basinghall-street, E.C., and Orpington, Kent:—

R. Lowe	£1,540 0 0
J. Otway	1,370 0 0
W. Payne	1,313 0 0
Arnaud & Son	1,300 0 0
T. Crossley	1,299 0 0
Owen	1,278 14 0
Somerford & Son	1,245 0 0
T. Knight	1,189 0 0
W. Holt (accepted conditionally)	1,160 0 0

HERNE BAY (Kent).—For the erection of the R.C. Church of Our Lady of the Sacred Heart, at "The Retreat," Herne Bay, Kent. Mr. Albert Vicars, architect, 151, Strand, London:—

Thos. Heath, London	£5,984 0 0
Grover & Son, London	5,926 0 0
Patman & Fotheringham, London	5,780 0 0
Chas. Trask & Sons, Dunball, Somerset	5,677 0 0
T. H. Adamson & Sons, Ealing, Middlesex	5,598 0 0
T. L. Greene, London	5,470 0 0
Wm. Gidrey & Co., London	5,468 0 0
E. T. J. Adams, Herne Bay*	4,955 13 3

* Accepted.

KETTERING.—For constructing reservoir embankment, filters, service reservoir, and laying three miles of mains, for the Kettering Waterworks Company. Mr. Thomas Hennell, engineer, 6, Delahay-street, Westminster:—

W. Cunliffe, Dorking (accepted)	£13,379 0 0

LECHLADE (Gloucestershire).—For the construction of Works in connexion with the water-supply for the Farringdon Union Rural Sanitary Authority. Mr. F. W. Bartield, F.S.I., engineer, 93, Lancaster-road, Stroud-green, London, N. Quantities by the engineer:—

Chas. East, Burford, Oxon	£1,669 11 11
Jos. Bowley, Lechlade, Gloucestershire	1,445 11 5
Drew Bros., Chalford, Gloucestershire	1,437 19 0
J. Pickthall, Leicester (accepted)	1,261 4 0

[Engineer's estimate, £1,265. 7s. 6d.]

LONDON.—For sundry works required to be done in alterations and additions, and for the erection of a new billiard-room at the "Pegasus Tavern," Green-lanes, Stoke Newington, N., for Mr. W. H. Ward. Mr. Horace T. Bonner, architect, King-street, Cheapside. Quantities supplied:—

Alterations and Additions.

Evans, Upper Holloway	£1,893 0 0
Jerrard, Lewisham	1,180 0 0
Jackson & Todd, Hackney	1,128 0 0
Spencer & Co., Lambeth	1,075 0 0
Mollett, Stoke Newington	1,019 0 0
Veale, Stoke Newington	967 0 0

New Billiard-room.

Mollett	£371 0 0
Jerrard	360 0 0
Evans	359 0 0
Jackson & Todd	340 0 0
Spencer & Co.	270 0 0
Veale	263 0 0

LONDON.—For the construction of dock and foot-bridge at the west end of the Putney Embankment, Putney, for the Wandsworth District Board of Works. Mr. J. C. Bedford, C.E., surveyor. Quantities by Mr. W. E. Stoner:—

Alfred Thorn	£4,994 0 0
John Mowlem & Co.	3,798 0 0
Chas. Killingback	3,690 0 0
B. Cooke & Co.	3,672 0 0
John Aird & Sons	3,600 0 0
Geo. Neal & Co. (accepted)	2,389 0 0

[Surveyor's estimate, £3,300.]

LONDON.—For repairs, &c., at the Homerton Workhouse, for the Guardians of the Poor of the City of London. Messrs. Davis & Emanuel, architects:—

Lewis & Son	£1,609 12 9
Leach	1,571 13 0
Whitehead	1,469 0 0
Barker	1,443 0 0
Hooke	1,443 0 0
Bax	1,314 0 0
Jackson & Jennings	1,299 2 0
Rider & Son	1,298 0 0
Barrett & Power	1,291 4 7
Little & Senecal	1,230 0 0
Young & Co.	1,193 0 0
Holland	1,179 0 0
W. Sturmer	1,143 0 0
Saed	1,134 15 0
Ecbey	967 0 0

LONDON.—For erecting new Congregational Church, Queen's Park, Harrow-road, London. Mr. Rowland Plumbe, architect, 15, Fitzroy-square, London, W.:—

Treasure & Son, Neal-park, N. (accepted)	£6,650 0 0

[There were fourteen competitors.]

LONDON.—For various additions to the Royal Agricultural College, Camden Town. Mr. Arthur Vernon, architect, 26, Great George-street, Westminster:—

Holland & Hannen	£1,460 0 0
Bywaters	1,335 0 0
Stuart (accepted)	1,263 0 0

LONDON.—For repairs to buildings and furniture, Mansford-street School, E., for the School Board for London:—

Davis Bros.	£137 13 0
T. Cruwys	101 13 0
C. Willmott	88 9 6
A. Cook	87 15 0
Barrett & Power	84 7 0
J. W. Nottingham	80 10 0
R. H. Reed	80 1 0
Thos. Hooke	72 10 0
W. Carter	55 0 0
W. Pratt	51 8 0

LONDON.—For kerbing and channelling works in Norway-road and Chelverton-road, Putney, for the Wandsworth District Board of Works. Mr. J. C. Bedford, C.E., surveyor:—

John Bell	£761 2 5
Turner & Son	746 0 0
Wm. Griffiths	734 0 0
Alfred Palmer	696 0 0
Thos. Adams	634 0 0
A. T. Calley	619 0 0
Geo. Bell (accepted)	574 0 0

[Surveyor's estimate, £691.]

LONDON.—For decorative and sanitary work at No. 19, Randolph-crescent, Maida Vale. Mr. Delissa Joseph, architect, 17 and 18, Basinghall-street, E.C.:—

A. W. Hammond	£486 10 0
Turtle & Appleton	440 0 0
J. W. Falkner	395 0 0
J. Martin (accepted)	349 0 0

LONDON.—For additional story and decorative work at No. 23, Pembridge-gardens, Bayswater. Mr. Delissa Joseph, architect, 17 and 18, Basinghall-street, E.C.:—

E. J. Young (accepted)	£295 0 0

OULTON.—For two pairs of cottages, Oulton, near Lowestoft, for Sir Savile B. Crossley, Bart., M.P. Messrs. Bottle & Olley, architects, Great Yarmouth:—

Jas. Leggett, Yarmouth	£956	0	0
Cork & Beech, Yarmouth	822	0	0
Samuel Norman, Blundeston	796	0	0
Arthur Bedwell, Lowestoft	785	0	0

ROTHERFIELD (Sussex).—For new residence at High Steep Farm, for Mr. Robert H. Halford. Mr. C. Stuart Robertson, architect, Finsbury-pavement, E.C.:—

H. & E. Lee, London	£1,899	0	0
Strange, Tunbridge Wells	1,798	0	0
Goldsmith, Crowborough	1,793	0	0
Mansfield & Son, Tunbridge Wells	1,790	0	0
Moon, A., Rotherfield	1,738	0	0
Adams, H., Tunbridge Wells*	1,608	0	0

*Accepted.

SALISBURY.—For the erection of new schools, Fisherton Anger, Salisbury, for 480 children. Mr. Fred Bath, architect, Crown-chambers, Salisbury. Quantities supplied:—

H. J. Kite, Fisherton, Salisbury*	£2,629	10	0

*Accepted.

SOUTHBOROUGH (near Tunbridge Wells).—For building a mixed school at Southborough for the Rev. H. Deardon. Messrs. Brett A. Elphicke and Albert Howell, architects, 50, Queen Anne's-gate, Westminster:—

Mansfield, Tunbridge Wells	£1,530	0	0
J. Jarvis, Tunbridge Wells	1,466	0	0
Punnett & Co., Tonbridge	1,444	10	0
Gallard & Son, Southborough*	1,395	0	0

* Accepted subject to alterations.

STAINES.—For erecting new Wesleyan Chapel at Staines. Mr. H. Isitt, architect, Bradford:—

Ingram, Woking	£3,950	0	0
Mathews & Mann	3,937	0	0
Gray, Egham	3,745	0	0
Faulkner, Walton	3,590	0	0
Woods, Catlands Park	3,396	0	0
Knight & Son, Chertsey (accepted)	3,390	0	0
P. Peters, Weybridge	3,350	0	0
G. Reavell, Staines	3,250	0	0
Pillar, Teddington	3,097	0	0

SWANSEA.—For new offices, Fisher-street, for Messrs. B. Evans & Co. Mr. H. C. Portsmouth, architect, Swansea. Quantities by the architect:—

Thomas, Neath	3,230	0	0
Hilton, Swansea	3,200	0	0
Rees, Aberavon	2,984	4	7
Billings, Swansea	2,850	0	0
Morgan, Swansea	2,799	0	0
Bennett Bros., Swansea	2,788	13	9
Thomas, Watkins, & Jenkins, Swansea	2,650	0	0
David, Swansea	2,542	0	0
Jenkins Bros., Swansea (accepted)	2,325	0	0

SYDENHAM.—For alterations and additions to the Conservative Working Men's Club, High-street, Sydenham. Mr. Henry Currey, architect:—

T. R. Roberts, Forest-hill	£465	0	0
R. H. Stevens, Sydenham	462	13	6
Waddington & Co., Limited, Sydenham (accepted)	437	0	0

Alterations, &c., at the Travellers' Club, Pall Mall.—In reference to the list of tenders for this job, published by us last week, Mr. W. J. Mitchell, of Dulwich, writes to say that his tender for the work, amounting to 1,935*l.*, was omitted. The omission was made by the sender of the list, and not by us.

Additions to House, Maida Vale.—Messrs. A. White & Co. write with reference to the tenders for this job, published in our last, that their tender amounted to 2596. The work was, however, cut down by the architect, and the sum agreed upon after that operation was 2077. It was not stated by the sender of the list that the last-named amount was an amended tender.

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TO CORRESPONDENTS.

H. W. (It is absurd to address such a question to us in such vague terms. Cost depends to a great extent on materials used, locality, &c.; and "pretty designs" are not kept in stock anywhere that we are aware of, nor would they be of much use if they were. A house has to be planned and designed for its situation to be satisfactory. Choose your site, and go to a good architect for a design for the site. He will make you rough sketches and an estimate first).—C. L., Paris (address noted and pamphlet received).—G. M. L. (shall have attention).—T. G. & Son (see "Note" in this number).—C. M. (thanks).—R. W.—R. J. L. (amounts of tenders should be sent).—E. T. (ditto).—P. M. R. (the list of tenders is inserted, but we cannot comply with your other request).—R. R. M.—J. P. & Co.—W. P. P. Co.—H. I. E. (has already appeared).—T. G. W.—T. W. C.

All statements of facts, lists of tenders, &c. must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

NOTE.—The responsibility of signed articles, and papers read at public meetings, rests, of course, with the authors.

We cannot undertake to return rejected communications.

Letters or communications (beyond mere news-items) which have been duplicated for other journals, are NOT DESIRED.

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